

Digital Scholarly Editions as Interfaces

Schriften des Instituts für Dokumentologie und Editorik

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Digital Scholarly Editions as Interfaces

edited by

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Preface

The present volume “Digital Scholarly Editions as Interfaces” is the follow-up publication of the same-titled symposium that was held in 2016 at the University of Graz and the twelfth volume of the publication series of the Institute for Documentology and Scholarly Editing (IDE). It is the result of a successful collaboration between members of the Centre for Information Modelling at the University of Graz, the Digital Scholarly Editions Initial Training Network DiXiT¹, a EC Marie Skłodowska-Curie Action, and the IDE. All articles have undergone a peer reviewing process and are published in Open Access. They document the current state of research on design, application and implications of both user and machine interfaces in the context of digital scholarly editions.

The editors of the volume are grateful to the Marie Skłodowska-Curie Actions for enabling not only the symposium in 2016 but also the publication of the present volume with their financial support. Special thanks are also due to the staff of the Centre for Information Modelling, above all Georg Vogeler, who contributed to the successful organisation and completion of the symposium and this volume with their ideas and continuous support. Furthermore we want to thank all authors as well as all peer reviewers for the professional cooperation during the publication process. Last but not least we want to thank the many people involved in creating the present volume: Barbara Bollig (Trier) for language corrections and formal suggestions, Bernhard Assmann and Patrick Sahle (Cologne) for support and advises during the typesetting process, Selina Galka (Graz) for verifying and archiving (archive.org) all referenced URLs in January 2018, Julia Sorouri (Cologne) for the design of the cover as well as the artist Franz Konrad (Graz), who provided his painting “Desktop” (www.franzkonrad.com/gallery/desktop-2008-2010/) as cover image.

We hope you enjoy reading and get as much intrigued by the topic “Digital Scholarly Editions as Interfaces” as we did.

Graz and Berlin, September 2018, the editors

¹ dixit.uni-koeln.de

Introduction

Discussing Interfaces in Digital Scholarly Editing

Roman Bleier, Helmut W. Klug

University of Graz

Abstract

Interfaces define how research material is presented. They shape the view recipients acquire from historical sources. Since the digital medium is more open to variations than the once traditional form of presenting Scholarly Editions in printed book form, discussions on how to deal with the new possibilities started at a very early stage after the emergence of digital scholarly editions. In the beginning these were strongly influenced by traditional presentation practices but have shifted to aspects more associated with the digital paradigm. Theoretical approaches towards interfaces, however, were only sporadically published and have been continuously demanded by the scholarly community. This introduction attempts to summarize the scholarly discussions on interfaces and provides an overview of the papers presented in these proceedings: they offer both theoretical approaches and discussions of practical implementations together with studies evaluating interfaces.

Early 2016, a heated discussion sparked off at the Centre for Information Modelling at the University of Graz about the role of interfaces in digital scholarly editions (DSE) and the question of whether the DSE itself takes up the role of an interface between documents, users and machines. This discussion led to the decision to hold a conference about the topic in September of the same year - entitled "Digital Scholarly Editions as Interfaces". The aspired format for the conference was a moderate setting to provide a stage for early career researchers and the fellows of the Digital Scholarly Editions Initial Training Network DiXiT, a European Commission Marie Skłodowska-Curie Action, to present their projects, ideas and ongoing research on the relationship between interface and DSE. The overwhelming response to the call for papers revealed the strong interest in this topic of the Digital Humanities (DH) community. The result was a densely packed two day symposium with an international audience and speakers. Accounts of the event can be found on the DiXiT blog (Bleier et al., "Report") and on H-Soz-Kult (Bleier et al., "Tagungsbericht").

The conference programme was framed by two inspiring keynote presentations by Dot Porter of the Schoenberg Institute for Manuscript Studies at the University of Pennsylvania and Stan Ruecker of the School of Art and Design at the College of Fine and Applied Arts at the University of Illinois. Porter opened the conference. In

her presentation “What is an edition anyway?” she discussed different definitions of edition and revealed the results of her latest survey on the usage of editions (printed, digitized, and digital). She related the survey results to her earlier surveys (from 2002 and 2011) and showed that a certain inhibition threshold exists towards using the digital medium as means of presentation. Her bold closing statement “Data over Interface” provided plenty of grounds for lively discussions throughout the conference whether the data or the interface are the integral part of a DSE, and in consequence, whether the machine or the human user is the primary addressee of a DSE.

In contrast, Stan Ruecker set the focus of his keynote on the aspect of the design process in general and the design of creative and experimental interfaces for Humanities and Cultural Heritage purposes in particular. He emphasized his arguments with examples from various research and design projects strongly focusing on the experience of scholarly readers. He concluded that the social and dynamic aspect of scholarly reading should play a more important role in the designing of DSEs.

According to the Oxford English Dictionary interfaces are:

A means or place of interaction between two systems, organizations, etc.; a meeting-point or common ground between two parties, systems, or disciplines; also, interaction, liaison, dialogue.

This rather general definition still hints at the complexities the concept of “the interface” incorporates. In DH it not only contrasts humanities with computer sciences and design aspects but also human to human with machine to machine communication as well as human computer interaction. The role of the interface and along with this role, its definition varies according to the person, domain, interest, use (etc.) it is associated with. Interface research deals with a vast complexity of the research topic, the amount and particular structure of humanities’ data, as well as the diverse collection of affected research domains. Equally demanding are the rapidly evolving technology, with the ever changing demands on both publishers and recipients of editions and interfaces. Additionally, over hundreds of years the distribution of knowledge has been associated with the form and feel of the book (Burdick et al. 139). The Scholarly Edition has a long tradition in print and, hence, these experiences and associations with the printed edition strongly shape the way how DSEs are designed today. However, is it indeed necessary for editors to use a skeuomorphic design approach, trying to mimic the book? Are only DSEs that follow the in order to accepted and used by the scholarly community? To what extent does such an approach hinder innovation and the development of more efficient solutions for DSEs? (Pierazzo 170–175)

Understanding the DSE itself as an interface means understanding it as a connection point between historical documents and the user, whether a human being or a machine.

Accordingly, we are usually confronted with two types of interfaces in DSEs: the Graphical User Interface (GUI), and the Application Programming Interface (API). GUIs are a central means of communication between human users and machines. They are central to research as many researchers are not accessing the data produced by a digital scholarly edition directly, but prefer a graphical layer that presents research data for reading, studying and analyzing. The GUI lets the user navigate through the research material and the web presentation built around it. However, it has to be remembered that an interface (GUI or API) of a DSE is always closely linked to the data model of the underlying data and the editorial principles expressed in this data model, in that regard it is a form of pre-selective data management. Interfaces are an interpretation of knowledge and provide users with a more or less “guided tour” through the data and its general presentational setting. Furthermore, they allow the user to answer research questions and aim at supporting the generation of knowledge. Over the last decade the already mentioned APIs have gained importance for DSEs as editors increasingly see their editions not only as static texts published online, but as data that can be linked to other data to answer interesting research questions. The API allows data exchange on a machine to machine level which results in a “guided tour” from DSEs that can be aggregated, interlinked with each other and used to address further research questions by other agents.

As early as the turn of the century, Bethany Nowviskie aligned the highly technically connoted term “interface” to digital scholarly editing, demanding in the middle of the initial enthusiasm a stronger theoretical reflection of the possibilities the (then) new media posed. A critical examination of the topic has also been demanded very early by Jerome McGann in 2001 (171): He witnessed the slow change from a bibliographical to an interface culture. McGann argues for a meaningful exploitation of the familiar media and an aesthetic digital conversion process since, according to him, scholarly book and digital culture do have much in common. What he is missing, however, is the reflective capacity of the digital tools and it is here that he would anchor the potential of the interface. Years later, the critique that the user interface is broadly neglected in the conception of the DSE was verbalized by Hans Walter Gabler in 2010 (48). For him, the user of an edition is still trapped in the traditional receiving role. Editors do not see the user as an equal or peer, and participation in or interaction with a digital edition is not a task available for the user. Envisioning the DSE as the future medium of scholarly editing, Gabler considers the active user involvement to be highly significant. The challenge of social editions, however, lies not in the technical difficulties, as interfaces and workflows are already available, but revolves around theoretical and methodological questions (Brumfield; Robinson, “Theory of Digital Editions” 122).

Similarly, Michael Sperberg-McQueen (30) sees editors migrating from an unruly but well-known (print) to a chaotic, unpredictable environment (digital). One of his

solutions to get back a solid user base is to provide problem-solving interfaces. In order to meet these needs of humanities scholars Roberto Rosselli Del Turco ("After the Editing") was one of the first to introduce a set of design elements DSEs should provide beyond general interface functionalities: these include for example hypertext functionalities, special character handling, image manipulation, advanced search, and complementary data manipulation tools. The demand for a theoretical approach towards the roles the interfaces of a digital edition have to offer was taken up more recently by Patrick Sahle ("Scholarly Digital Edition" 159f.) who points out that as a digital presentation an edition is no longer just data but also design and program code, and in a digital edition one cannot live without the other. A theory of digital editing would have to assess the importance, define the relationship, and estimate the interdependency of data and interface(s), i.e. content and form. It would also have to consider the interaction between historical source, editor and user. Sahle, like others before him, strongly calls for systematic research into this field and expresses the need for a steady development from practise towards theory building. In this context Elena Pierazzo (186-192) points out the importance of digital preservation of DSEs: archival storage of an edition's data is technically no problem at all, but in relation to interfaces this statement proves much more problematic as it not only involves data standards but also diverse and potentially conflicting versions of different software or even hardware architecture. Since interface designers, and not the editors themselves usually make the interface, they emphasize aesthetic aspects. Pierazzo also investigates the role of aesthetics in GUI design for usability of DSE and concludes that both stability of data and a GUI designed with a certain uniformity are the most cherished factors for a user-oriented presentation. Insecurity in embracing the new possibilities often results in a poor interface and in an annoying user experience (Rosselli del Turco, "Battle" 230). To free the user from the passive consumption of the GUI Johanna Drucker suggests that the interface should not be seen as an object. She promotes instead a sustained, interpretative engagement with the data, the purpose of which is to inspire thinking and generation of knowledge. Therefore, she suggests:

...multiple points of view, correlatable displays, aggregated data, social mediation and networking as a feature of scholarly work, and the qualities of games with emerging rule sets. (§35)

For her an

Interface is a space of affordances and possibilities structured into organization for use. An interface is a set of conditions, structured relations, that allow certain behaviors, actions, readings, events to occur. (§31)

A solution that would free the editor of the burden to provide a GUI, according to Sahle (*Digitale Editionsformen* 37), could be the provision of the editorial output as

mere data via APIs - it would be up to the user to access and analyze this data by her own means, or third party organizations to offer structured forms of access. In the context of interfaces, DH researchers nowadays discuss working with the data at hand, visualizing text and meta information, analyzing and exchanging data, and, of course, the edition as a socially collaborative effort (e.g. Siemens et al.) and also a research commodity (Robinson, “Collaborative Digital Editions”).

The conclusion from this historical overview seems to be that the book paradigm, which was strongly discussed in the early treatises, and the book itself which was often stylized as a feared opponent to early DSEs are no longer the main concern of the digital editor. The digital edition seems to have fully embraced the possibilities of the new media. Even if this is no longer so strongly problemized in scholarly discourse, in the assessment of Joris van Zundert (103-106) the problem still persists and the majority of contemporary DSEs are mere metaphors of books a long way from even utilizing the possibilities of hypertext. He relies on Peter Robinson’s (“Theory of Digital Editions” 123) distinction of editorial approaches “text-as-document” vs. “text-as-work” to contrast recent developments. Like Nowvieskie or McGann at the beginning of the century, and so many others in the years to come Zundert again strongly calls for an intensified methodological discussion.

The contributions in this volume build on these conflicting perspectives. Experts of DSEs and Interface Design, editors and users of editions, web designers and developers discuss the relationship between digital scholarly editing and interfaces. In this context the conference team provided a broad selection of topics as intellectual incentive. The discussion was meant to include the critical reflection of the (graphical/user) interfaces of DSEs as much as conceptualizing the digital edition itself as an interface.

- How can DSEs take full advantage of their digital environment without losing the traditional affordances that make an edition “scholarly”? What is the role of skeuomorphic tropes and metaphors like footnotes, page turn and index in the design of DSEs and concerning the user interaction?
- Do interfaces of DSEs succeed in transferring the complexity of the underlying data models?
- Plurality in representation is a core feature of DSE. How do interfaces realize this plurality? Do we need different interfaces for different target audiences (i.e. scholars, digital humanists, students, public)?
- How can user interfaces of DSEs succeed in transmitting Human Computer Interaction design principles like “aesthetics”, “trust”, and “satisfaction”?
- Citability and reliability are core requirements of scholarly work. Which user interface elements support them? How can we encourage the user to critically engage with the DSE?

- What are the users of a DSE actually doing: are they reading the text or searching and analyzing the data?
- Can we conceptualize machines as users? How can we include Application Programming Interfaces (APIs) in the discussion on DSEs as interfaces?
- Does the development of user interfaces for DSEs keep up with the rising distribution of small handheld devices? Will interfaces on tablets greatly differ from those on computer screens and perhaps encourage a larger readership?

These and other questions on the topic “Digital Scholarly Editions as Interfaces” were vividly discussed during the conference. This volume aggregates twelve of the presented papers that contribute to the debate above and provides a wide range of case studies that highlight the current state of interfaces in DSE. The edited volume is structured according to three methodological perspectives or approaches towards interfaces in textual scholarship: theory, practise and empirical (user) studies. The volume starts with the section ‘Theorizing the Interface’ that includes papers discussing various aspects on the role, importance and needs of interfaces from a theoretical point of view, it continues with the section “The Interface in Practise” containing papers reporting on practical work on the interface of editions. The volume concludes with the section “Evaluating the Interface” in which two papers describe the concrete results and insights derived from user studies.

The first section “Theorizing the Interface” is opened with a contribution by *Tara L. Andrews* and *Joris van Zundert*. In literature about DSE the interface is often seen as being secondary and the data is moved to the centre of attention and sometimes this even results in quite hostile remarks about the interface. Andrews and Zundert use this hostility and critique as a starting point to discuss the relevance of GUIs and the key function they play communicating editorial information correctly. Looking at a number of case studies, they carefully assess the arguments and statements editors make about the GUIs of their editions. By carefully using interface elements editors can support an argument, and a clumsy interface design and careless use of interface elements can have negative consequences for the argumentative point an editor wants to make. Therefore, a well-argued and well-arguing GUI is central to the communication between an editor and the user of a DSE.

Wout Dillen continues this line of thinking and elaborates on how the editors can, and should, make a statement using an edition’s GUI. He suggests that the GUI may be seen as the new paratext of a digital edition. Using the Beckett Digital Manuscript Project (BDMP) as a case study, he shows what impact the GUI can have on how an edited text is read. A central point in Dillen’s argument is that depending on what the user is looking for in an edition and to what extent she is immersed in the texts and data, different levels of guidance are needed. Using Dante’s *Virgil* as a metaphorical guide through a maze, he describes how an editor assists a user to find

her way through the maze of digital texts and data provided by a DSE. Without a GUI a user is lost in texts and data, as Dante would have been in the *Inferno* without the assistance of Virgil.

Shane A. McGarry discusses the issue that digital scholarly editions still follow too closely the printed book in design and functionality. He emphasises the need to consider the interactivity of the interface, which is an advantage over the printed book. In his analysis he focuses on a number of components of digital editions that have been developed originally in a book context and are still used in digital editions. In contrast to the linear reading of the book, the digital medium supports a number of alternative reading modalities. Exploring key literature about digital texts and digital reading, interaction design and information architecture, McGarry suggests that the role of the interface is not only to lead the user to the information she is looking for, but also to engage the reader, to retain and help to recall information. He highlights that in contrast to some arguments that suggest data is important and the interface is not, it has to be kept in mind that attraction is an essential component in a reader's consideration to use an edition and, hence, of its success.

Ginestra Ferraro and *Anna-Maria Sichani* take a closer look at project management and design processes used for the development of GUIs for digital scholarly editions. The authors have observed that few DSE projects use project management and product development strategies that are used in the commercial world. This is considered an issue as they could be beneficial for the development of DSEs too. Ferraro and Sichani suggest the integration of design, both as a conceptual framework and as a methodological awareness, early in the development process, in order to assure a better quality product. They outline different software design principles, highlight the relevance of user testing, and discuss an agile-oriented workflow for digital scholarly editing projects. Ferraro and Sichani emphasise that interactions generated by users are an important asset that should be used for future development and can contribute to developing better interfaces for digital editions.

In the final chapter in this section *Stefan Dumont* discusses the important role of GUIs and APIs in the context of digital editions of correspondence. The editing of correspondence has benefited greatly from digital methods in the past fifteen years. On the one hand, the GUI provides a flexible means for a user to interact with edited letters, much better than printed editions of letters would ever allow, for example, correspondence networks can be visualized and explored. On the other hand, the API provides access to highly-structured data, that can be used for research, shared and connected to other data on the internet. In that context, using the project *correspSearch* as an example, Dumont emphasises the important role metadata standards play when making data from different editions interoperable and accessible via a single platform.

The second section of the book – The Interface in Practice – looks at practical aspects of interface design. It starts with a report by *Roberto Rosselli Del Turco* and *Chiara di Pietro* about the user interface design of the new EVT (Edition Visualization Technology) 2.0, a tool that uses a TEI/XML source document as input to produce a digital edition. In the development of the software tool emphasis has been placed on design of an intuitive user interface. The authors give insights into the design process, discuss problems they faced and what decisions they made to increase the usability of EVT. Besides the design process they also discuss technological challenges and how the software stack changed for the new EVT.

Joshua Schauble and *Hans Walter Gabler* discuss interface design in the context of a genetic edition of Virginia Woolf's "A Sketch of the Past". The chapter focuses on challenges in the encoding of certain features of genetic editions with the TEI and visualization strategies in regard to the interface. The visualization as such must be realized through (sets of) visualization software. From the construction-in-progress of one such set of modules, the essay demonstrates the design and describes the operation of one modular interface, a Diachronic Slider.

The chapter by *Elly Bleeker* and *Aodhán Kelly* also focuses on interfaces of genetic editions. Using a digital museum exhibit, Brulez Digital Exhibit (BDE), as a case study they explore how user interfaces of genetic editions may be designed to communicate complex research results to non-expert audiences. Additionally, the chapter discusses what can be learned from the collaboration between the university and the GLAM sector and how this impacted on the development of the user interface and dissemination strategies of the project.

In his chapter *Jeffrey C. Witt* argues that too many editions still focus on the GUI and are rooted in the "text-as-document" paradigm. Following the idea of the semantic web, texts can be seen as a series of data points and relationships between them and between data points of other texts. He argues that digital editions should move towards a "text-as-network" paradigm and a clear distinction between the data that can be reused by machines and connected to other data and the presentational layer, i.e. the interface(s) for the human user. The first step to this development has to happen in our heads: instead of thinking first how we want to publish and present the edited texts, we have to think of texts as data first. Using the *Scholastic Commentaries and Texts Archive* (SCTA) as an example Witt shows the potentials of such a paradigmatic shift. His paper illustrates further how an edition inspired by the "text-as-network" paradigm could look like and that this could result in a plurality of interfaces for various research interests.

Hugh A. Cayless discusses the challenges of user interfaces for critical editions of classical texts and uses the example of the *Calpurnius Siculus' Bucolica* edition, which was created as a pilot for a series of new born-digital editions of classical texts by the Digital Latin Library (DLL). The chapter highlights that an edition's data model

and structured data play a central role and form the basis for interfaces. He proposes a web interface using a JavaScript library with the name CETELcean that directly uses the data model of the edited text. It aims at rich reading environments of digital critical editions and increased usability for scholars.

Federico Caria and *Brigitte Mathiak* open the last section of the book – Evaluating the Interface – and evaluate the results of a survey and user tests with open task scenarios on three digital scholarly editions: Saint Patrick's Confessio, Walden: A Fluid Text Edition, and the Emily Dickinson Archive. The goal of the survey and user tests was to gain insight into how end users benefit from DSEs in contrast to paper editions and which kinds of interfaces are more successful than others. Another issue the survey uncovered was that in some editions the user has the feeling of getting lost. Therefore, a minimalistic interface that focuses on the main tasks a user wants or might want to execute could be preferable in terms of usability over an overly complex user interface.

The final chapter also focuses on user studies, but in a different context. *Elina Leblanc* conducted a user survey on the user interface of the digital library Fonte Gaia. In her contribution she presents the survey results and uses them as a starting point to discuss similarities and differences between the user interfaces of digital libraries and digital scholarly editions. She argues that the three roles of people accessing DSEs (the reader, the user, and the co-worker) can also be translated to the digital library context.

The various exciting contributions to this book and the lively discussions at the conference in autumn 2017 convince us that in order to accommodate as many recipients as possible, DSEs require both a carefully designed, user-centred and task-oriented GUI and a well-documented API that provides access to the data in the edition for further research. In regard to GUI design much can be learned from existing processes and strategies from the design and media industry, even though this certainly requires an even closer integration of the various areas of competence (textual scholarship, digital humanities, design) than is currently the case. As Rucker mentioned in his keynote: the interface design of DSEs has to be a collaborative and interdisciplinary task, that brings together knowledge and skills from different domains.

Many of the projects presented here are ongoing research and highlight the urgency of the topic. These proceedings show the great variety that exists in the approach to and study of this topic. It is to be hoped that the discussion will continue towards a humanities inspired line of thinking about the theory of DSE interfaces.

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Theorizing the Interface

What Are You Trying to Say?

The Interface as an Integral Element of Argument

Tara L. Andrews and Joris J. van Zundert

Abstract

Graphical interfaces to digital scholarly editions are usually regarded as disconnected from the content of the edition, enough so that an argument has developed against the use of interfaces at all. We argue in this paper that the indifference and even hostility to interfaces is caused by a widespread incomprehension of their argumentative utility. In a pair of case studies of published digital editions, we conduct a detailed examination of the argument their interface makes, and compare these interface rhetorics with the stated intentions of the editors, exposing a number of contradictions between ‘word’ and ‘deed’ in the interface designs. We end by advocating for an explicit consideration of the semiotic significance of the elements of a user interface: that editors reflect on what aspect of the argument their interface expresses, and how that is adding, or perhaps subtracting, from the points they wish to make.

1 Introduction

Some of the tricks of the trade involved in meeting these challenges include studying the design of infrastructure, understanding the paradoxes of infrastructure as both transparent and opaque [...] (Susan Leigh Star, *The Ethnography of Infrastructure*, 377)

In a combative paper presented at the Digital Humanities Conference 2013 in Lincoln Nebraska, Peter Robinson posited: “Your interface is everyone else’s enemy” (*Desiderata*). He asserted that the very thing which is meant to open up a digital text to users can, rather paradoxically and frustratingly, limit its uses. Infrastructure, as Susan Leigh Star notes, is both transparent and opaque – so long as it works as expected, it is effectively treated as invisible (transparent), but as soon as its affordances or functionality cease to match the needs of its users, those users are at a loss for how, or indeed whether, to continue using it (opaque). Interfaces are themselves a form of infrastructure, subject to the same paradoxical properties. The very purpose of an interface to a scholarly digital edition, whether it be a graphical, command-based, or programmatic interface, is to open up textual information to reader-users. Yet most of these interfaces are designed in a way that renders them neither really open

nor neutral. Robinson's primary complaint was that most interfaces of digital scholarly editions are ultimately nothing but façades behind which textual data is hidden. They proclaim 'behold... a representation of the text', but they offer users no further means for downloading data, for reading offline, for adding their annotations, or for interacting in any other meaningful way with the text.

We argue here that the reaction against graphical interfaces for scholarly digital editions, exemplified by but not limited to Robinson's polemics, is caused by a widespread incomprehension of the argumentative utility of interfaces. Up to now, most interface design has been carried out at the level of "unconscious incompetence" (Wikipedia Contributors, *Stages*) by textual scholars and the technicians they employ – it is being done, but without much explicit conscious understanding of the impact and effect of particular design decisions. Creators of digital scholarly editions regard interfaces primarily as a utilitarian means of representing the edition, and less often tend to consider the interface as a site of interaction between text and user. We have not developed an explicit understanding of how an interface argues, but such an understanding is necessary to reason about its form, function, and telos. Our purpose here is thus to explore the argumentative aspect of the interface as a first stage in the development of a more consciously-argued approach to graphical interfaces for digital scholarly editions. Our approach is one of critical reception: we will not explore here the mechanisms by which scholarly editions are produced, nor comment on the division of labour that typically goes into the creation of their interfaces. Rather, we will engage with those interfaces on their own terms, as published artefacts oriented toward a particular audience, and examine the messages we "read".

2 The interface as medium

The user interface of digital scholarly editions is often treated as a content-free and ideally interchangeable appendage to that which is actually considered the scholarly effort or work – the examination and preparation of the text and the scholarly justification for how this preparation was carried out. This is related to the conviction that the interface is, or at any rate should be, a self-contained, unambiguous, non-value-laden digital object that simply transmits a visualisation of digital textual data to a user-reader. At most, its effect is regarded as a visual permutation or aesthetic adornment of the underlying content, the textual data; its purpose is usually to present the text and edition in a way that caters to those who wish 'simply' to read the text, or a particular version thereof (although, as we will discover, scholarly editors often produce digital editions that seem to argue *against* reading).

On a theoretical level, Hans Walter Gabler (47–48) has argued that the 'autocratic strain traditionally ingrained in the editorial enterprise' is in part to blame for this

attitude towards interface work. On a more pragmatic level, Roberto Rosselli Del Turco (*editing, SDE*) has pointed out some of the more common flaws in digital scholarly edition interface design. The more computationally-minded in the textual scholarship community clamour, as Robinson did, for machine readable access (APIs) to these editions, in order to apply their stylometric, machine learning, or other such techniques (e.g. Piper, Underwood, Kestemont et al.). Librarians, meanwhile, call for standardization of these interfaces and the underlying data in order to promote interoperability (cf. e.g. Besser).

While the Digital Humanities community engages in its skirmishes about user interface, data access, and interoperability, farther afield under the broad interdisciplinary umbrella of human computer interaction (HCI), the creation and evaluation of user interfaces has grown into an academic expertise of its own, strongly informed by disciplines as varied as graphic design, computer engineering, cognitive theory, and the social sciences (Rogers 2). Vivid debates on the importance of theory formation (e.g. Kaptelinin and Nardi), user experience (cf. Whittaker), and field studies on usability (e.g. Andreassen et al.) drive the field forward. It is thus an opportune time for us in textual scholarship to advance our understanding of interfaces based on this growing body of knowledge.

Here it is useful to point to the work of Alexander Galloway, who understands an interface not as some static digital object but as the *effect* that results from a dynamic process of transformation or mediation (Galloway viii). As a process of mediation, an interface translates data into different states. Interface effects may be neutral, but more likely they are not, because the processes causing them are usually not impartial automata, but (in a digital context) pieces of software and code whose existence, function, and working were motivated and intentional. As such, interface effects are caused by processes that represent the delegated agency of the persons that designed them (cf. Zundert).

Very little explicit awareness of this dynamic understanding of interface, of the effects caused when interfacing takes place, has crossed over to the literature on digital scholarly editions. How does the look and feel, the visual structure of information, affordances of interaction, or even the aesthetics of a given digital scholarly edition shape the experience of using it? Does the interface promote or discourage a particular mode of reading? Does it suggest or encourage a use beyond straightforward reading? This lack of awareness sits oddly with the point that has been made numerous times, beginning with Cerquiglini, that a scholarly edition is an argument about a text. If it is not particularly controversial to acknowledge that the visual appearance of a text or a picture has a marked effect upon how it is received by an audience – a point that is underscored by the design studies referred to above – then appearance is part and parcel of editorial rhetoric. We argue in this paper that, as producers of these editions, textual scholars need a much greater understanding of how their interfaces

Consider, for instance, the rather striking difference between the initial impressions of two digital scholarly editions: *La entretenida* by Miguel de Cervantes and *Digital Thoreau: Thoreau Digitized. Deliberately*. The first interface conveys a fairly conventional ‘scholarly’ perspective, feel, or idea about the text (see fig. 1). The reader can very quickly find his or her way to the features normally associated with printed critical editions: versions consulted, editorial guidelines, a presentation of the text accessible per segment of the play, a hyperlinked index of names, places, occupations, and so on. Four versions of the text are available; the version presented by default is not even that of the editor, but rather a transcription of the first edition with spelling normalised to modern practice (fig. 1).

In contrast, the aesthetics of the interface to the *Digital Thoreau* work in tandem with its subtitle to provide an experience not merely of the text but also of what it signifies to the editor: deliberation and reserve. This notion or suggestion, however, is very superficial – the edition hides the text to some extent under the layers of aesthetic, but once it has been found, the text turns out to be just as ‘densely scholarly’ as *La Entretenida* in that it provides multiple instantiations of the text, scholarly footnotes, multiple indices, and so on.

We acknowledge that it is walking quite a fine line to interpret what we see in this way – to describe what we believe to be happening, what it seems to mean and to what it pertains. Should we accept the interface as a utilitarian medium needed only to serve the text in a digital environment, and should we pay minimal regard to presentation? Or should we understand interfaces and their mediality as intentional expressions of the editors’ perspective on the digital edition as a concept, and as a set of deliberate choices about the representation of a text?

3 The interface as argument

Our first observation is that a digital edition’s interface is an argument – not just an argument about the text, but also an argument about the ‘attitude’ of the editor, a window into his or her take on methodology and the digital edition itself. It is also a revelation of the technical skills available to the editor. The interface tells us something not only about the methodology but also about the import of the edition. The *Digital Thoreau* offers this sort of non-textual stylistic communication in abundance – it argues not just through text but also through the creation of a certain mood with colours, layout, graphics. In contrast, the Cervantes edition makes little attempt to communicate a mood or an emotion; it is clear that these editors would argue that the interface is mostly beside the point, a more or less neutral technical means to an end.

As can be inferred from the attitudes cited at the beginning of this article, the development of an interface for a digital scholarly edition is generally treated as a

piece of design independent from the interpretative thrust of the actual content. It is thus considered to lie within the domains of engineering, interaction design, and aesthetics, and, perforce, well outside the domain of textual scholarship. Interfaces are considered essential to communicate content to the user, but they are also usually considered neutral and non-interfering – it is usually taken as a desideratum that they be explicitly divorced from the argument. This *othering* of the interface can easily be seen in the advice that is usually given to creators of digital editions: that for the sake of sustainability of their research data they should take care to separate content and functionality (e.g. Jannidis, Cayless).

Galey puts this othering in a historical perspective of textual scholarship, pointing to the argument made by DeRose and others: essentially, that a text is the same whether it is printed in Garamond or Times Roman. Others, such as McGann, Hayles, and Kirschenbaum, concerned with the material aspects of text and digitality, contend that meaning and form are ‘distinguishable but fundamentally indivisible’ (Galey 110–112).

DeRose’s argument may well have been informed by pragmatism: there are, of course, very good practical reasons to ensure a separation between form and content. These are primarily bound up in the fact that, up to the present, it is much more technologically feasible to archive static data in the form of plain HTML, XML/XSLT, or even relational or RDF-style database contents, than it is to archive the dynamic functionality of a software or web interface to those contents. Consequently, whatever scholarly content is not cleanly separable from the dynamic or interactive display logic of an edition made today is likely to remain unarchived and, thus, to be lost sooner or later.

This useful and pragmatic practice has, over time, developed overtones of a textual ideology that claims that content and meaning are unproblematically separable from form and function (Galey 110–113). The typical consequential advice to take ‘XML-ification’ to the core of the textual scholarship practice, and to put interface work in a peripheral realm of design and engineering, has a theoretical flaw at its core, which is the central tenet of this article. Just as there is no clean separation between data and interpretation, there is no clean separation between the scholarly content of an argument and its rhetorical form (Galey 94). We contend, moreover, that visual display and interactive functionality are an integral part of rhetorical form. The interface is thus an integral part of the argument that an edition makes about a text.

Cerquiglioni’s idea that an edition is a theory – and thus an argument – about a text is well-known within textual scholarship by now. Shillingsburg elaborates this idea specifically for the digital sphere: he differentiates between the archive, which collects primary materials and provides access to them while attempting to keep the mediating influence of interpretation to a minimum, and the edition, which will generally include an archive but the primary purpose of which is to provide a scholarly critical argument about the meaning of an archive or how it should be read.

Even so, these insights never had a great deal of overt influence on how editions are presented in their printed forms – a reader still expects to find a canonical reading text, one or more apparatuses, and notes provided by the editor.

In the case of digital scholarly editions, the situation can be very different. We start from the observation that there is no single canonical form for a digital edition, although this has become a desideratum for some (Rosselli del Turco, *Battle*; Czymiel) and although the appearance of guidelines (Rosselli del Turco, *editing*) and review journals such as RIDE (Steinkrüger) for digital editions and particularly for their interfaces will inevitably have the effect of normalizing certain practices. Nevertheless, a graphical interface (or even an API) is an object that is constructed to present data, which is itself constructed with reference to facts, which themselves are constructed objects.

It is worth pressing this point. In her article on graphical display perhaps most well-known for this very observation, Drucker points out that despite the implication in its very name that “data” (L. *dō*, *dare*, *datum*, “give”) is given naturally by the environment of its production, data creation is in fact a process of active capture of select information by the human or the human-designed algorithm that does the work (Gitelman and Jackson 3). This process of forming and becoming that data undergoes in a scientific context points to a careful selection and argumentation that underlies the presentation of data as meaningful, and as pertaining to a certain argument, as Latour and Woolgar claim (e.g. 255–256). This is not to deny the factuality of data in all or even most circumstances, but it becomes clear in this viewpoint that the data one collects, and the facts one presents, whether underlying the data or derived from it, are not only part of a larger argument but themselves also argumentative constructs.

We can put this in a more concrete perspective by considering the famous example of “bridges with politics”. These are the Long Island bridges designed by Robert Moses in the 1960s, that were supposedly built too low to accommodate public transport buses passing beneath them (Joerges 417–418). The original debate centred around whether the alleged inability of buses to pass underneath the bridges was intended to discourage the circulation onto the island of those racial minorities who were disproportionately dependent on public transportation systems to navigate around the city. That debate remains unresolved; the discussants could agree only on the unknowability of Moses’ specific intentions and motivations, and could certainly not agree on the precise degree to which his civil works furthered the alleged goal of keeping Long Island a *de facto* white-only zone. The anecdote and the debate serve primarily as a reminder that objects can be agents of politics, but also as an example of how facts can be marshalled in different ways to bring about interpretations of these objects (Woolgar and Cooper 443–444; also cf. Latour *Missing Masses*). For our purposes, it is worth noting that the objects in question – the bridges – also serve

as a physical interface of sorts: one of the disputed claims in the debate is that the freeways over which the bridges were built were the sole practical means of access to Long Island.

Computer code functions similarly as an argument, and as such it is not immune from politics. McPherson has opened the way for an argument about software not dissimilar to that of the Long Island bridges: to what extent, she asks, does the all-white context of the development of platforms such as Unix imply the lack in code of representation of or support for aspects of cultures that lie outside the white-majority mainstream? Although her article was intended less as a substantial accusation toward the Unix programming community than as a provocative talking piece, it has served to pull the curtain from an oft-perceived impartiality or neutrality of code and software. It would be naive at best to regard code as neutral on the grounds that it has at its very base a mathematical nature. In addition to that mathematical nature, it also has a rhetorical one. Pretty much since its inception, it has been argued that code has a literacy (e.g. Kay) that allows a programmer to wield a computer language as intentionally and as meaningfully as any other semiotic system. This eradicates any perceived boundaries between the writing of code and conventional authorship. Moreover, the ability of code to exert control may be far greater than that of conventional text, due to its executable nature that, in contrast to inanimate objects, allows it to adapt and react to specific circumstances (Zundert 365–366). Code, more than bridges and literature are, is a form of delegated agency, and there is little reason to assert that programmers suffer from less intent and bias than any other human being.

We can thus see that code is a construction that, at the very least, furthers, or engages with, a particular set of interpretative perceptions. Data is a construct, built in the very process of its generation. Even facts themselves are constructed, marshalled and interpreted to support or undermine argumentative propositions. How then can a user interface to a digital edition *not* be a constructed thing, with interpretations and intentions built in from the beginning? Even if a particular piece of code, software, or interface is not meant deliberately to exercise control or to effect certain policies, the production of code and interface remains a thing that is situated, that is: it is built in a context and by people endowed with a certain history, convictions, and cultural identity.

Cultural and historical situatedness thus motivate the development and structure of the interfaces we put on (digital) texts, whether overtly or covertly. This makes these interfaces non-neutral artefacts of the scholarly or technical work rather than neutral intermediaries; that non-neutrality is arguably amplified rather than mitigated by aesthetics. When building interfaces, we generally fail to account for these aspects of interface, and as a result we often ignore the argumentative aspect of the user interface that we provide.

4 The interface as language

And yet. Perhaps the greatest innovation of the digital space is that it gives us a tangible means to express our argument and theory about a text in ways that are not only not limited to the textual, but also not limited to the static. We constantly sing the praises of the possibilities granted to scholarship by these new forms of expression in digital space, and so it is important to set out what these comprise – linear, hierarchical, graph, or perhaps even time-lapse models of the text of the edition, which text can be represented as running text, as text alternatives, as variant graphs, or as tables; the inclusion of imagery or sound that may or may not pertain specifically to a particular portion of text, or alternatively to the argument that the editor wishes to make about the text; the ability to present these texts, images, and sounds either in a static way or dynamically, so that they vary in prominence or even in content, according to what the editor wishes to emphasize or what choices of emphasis the editor has allowed the user to make.

All of these choices, all of the decisions not only concerning the textual content but also the entire experience of its context, are determined by, and determine, what argument, theory, hypothesis, or association the editor has chosen to present. Just as there is not a single data format that will be able to satisfy all use requirements (Vitali), it is difficult to imagine that there can be one universal and universally satisfying interface for a scholarly edition, even when a shared underlying model or encoding standard is used.

At this point, we have reached something of an impasse. It is now clear that any interface is inevitably developed, and its arguments will be couched, in a particular semiotic environment that is extensively shaped by the cultural contexts of the author of a text, its editor, and its audience. The elements of user interface – visuals, colour, dynamic interaction – belong to this semiotic environment and, as such, constitute in themselves a kind of language. As yet, however, we only dimly understand how this language of interface works, what its argumentative properties and aspects are, for it has barely begun its development.

This is not specific to textual scholarship or to digital scholarly editions. Graphical user interface and interaction design work at a complex intersection of visual elements, written language, interaction, aesthetics, and the performativity of software. Although much research has been done on the usability and interaction aspects of this complicated mesh of communicative technologies (cf. Soegaard and Friis), very little theory has emerged about how it constitutes argument. Galey and Ruecker have attempted to make inroads into this problem, and Vanhoutte's ideas on minimal and maximal editions may also pertain to a theory of how interfaces argue in textual scholarship. Vanhoutte makes clear in any case that the argument is not limited to

the written language: simplicity or complexity of interface, for example, argue a level of accessibility for a given edition.

What is safe to assume or conjecture, though, is that different arguments and different critical frameworks should be expected to lead to different interfaces. As soon as we, the editors, consider our intentions for an interface to our editions, the user requirements and certainly the aesthetics begin to differ, and even conflict with each other. This conflict is, moreover, perfectly justifiable as the representation of the various possible arguments about our texts. While a particular group of scholars may agree, for example, on a particular mark-up model or a computational object model as a good common representation of their texts, the interface preferences of each will be an expression of what they individually intend to do – what argument they intend to make – with that model.

For instance, the presence – and even more, the prominence – of an interactive collation tool is linked to the argument that the collation is a changeable thing that should be left to the scholar-user to modify and interpret. Should the text be presented in the form of a graph? Such an interface relates to the argument that the text constitutes a sort of network that should be of interest to the reader-user. Yet another form may give pre-eminence to APIs and incorporate Jupyter Notebook and D3 based visualizations through which these APIs may be explored and used to tweak the text at will, which stresses a meta-argument: that the editorial argument rests solidly in the constitution of the data and its means of access. According to these interface choices, either the user is expected to analyse the text rather than simply reading it, or, at the very least, the editor is disclaiming any right to impose a web-based graphical interference in how the user chooses to read the text.

The possible interfaces for a scholarly edition can thus vary, sometimes radically, despite the inherent validity and fitness for purpose of each of them as expressions of the same underlying model. The situatedness of the scholarship that produced the edition is behind that variation: scholarly argument, aesthetics, human-computer interaction, and usability all contribute to complicate matters more than they help to establish some uniform ideal access to the text.

5 How do interfaces argue? Two tentative case studies

By now it is clear that interfaces argue in a culturally-induced form of symbolic language. Yet we hardly understand what constitute the verbs, nouns, and syntax of this language that is textual, visual, and interactive all at once. One possibility to explore how this language works in the case of digital textual scholarship is to observe and analyse it using methods similar to those of HCI, interaction design, and usability studies. We do so with respect to two case studies of digital scholarly

editions. These case studies are not by any measure a fair critique of some of the interfaces that have been built for individual digital scholarly editions. We fully acknowledge that the vast majority of scholarly editorial projects must get by on shoestring budgets, or sometimes on no budget whatsoever. It is therefore often the case that editors have specific wishes for the graphical interface of their editions that cannot be accommodated by designers, engineers, and usability experts within their severely strained financial and temporal budgets. Moreover, when it comes to digital scholarly editing, digital scholars are more often than not pioneers in a quickly changing technological landscape. Many editions based on certain digital technologies may be considered the epitome of what is possible when published, only to be regarded as ‘old fashioned’ when it comes to visualization almost overnight. For these reasons alone, it would not be fair to regard our discussion of these use cases as a sincere critique.

The issue at hand here is not, however, interface critique, but rather an examination of how interface constitutes or contributes to argument. We aim, therefore, to approach our task not as experts on (digital) scholarly editions, but rather as ethnographers of the interaction between human beings and digital technology. We acknowledge the considerations above but bracket them for the moment, taking the interfaces at face value and examining them before we consider what the textual scholars themselves state in their ‘About’ pages and introductions, and so without prejudicing our experience of what is apparent in the interface with any expectations set textually by the editor. We defer judgements and comparisons as much as possible; we observe the actual interfaces, and we try to estimate what their intended purposes, affordances, and assumptions are. Only then do we confront these observations with the declarations of the editors themselves as to the function and purpose of the digital editions (interfaces) they have built. The similarities, differences, perhaps even disconnects between findings and stated intentions will likely tell us much about how the rhetoric of the interface matches, supports, changes, or skews the argument that the editors claim to be making about the text and the edition.

5.1 Jane Austen’s Fiction Manuscripts

Our first case study looks at the edition of *Jane Austen’s fiction manuscripts* (review by Levy 2017; hereafter JA). We begin by considering the layout of information on the page, with reference to typical reader behaviour. When users scan a webpage for information that is interesting to them, their eyes move over the page in a kind of F shape: from left to right across the top, then from left to right across the middle of the page, and after that they scan the left side of the page from top to bottom (Nielsen). It is not clear whether this behaviour comes intuitively to users or whether this is induced behaviour due to many webpages being built according to the same

pattern, but for present purposes the reason behind the behaviour is not particularly important. We simply accept that the most salient information of a website ought to flow to the top and left of the screen. In the case of JA (see fig. 2), the first items we find are the page banner and a menu bar. To start with the latter: to the left we find 'Home', 'About', and 'The edition'. Intriguingly, 'The edition' does not lead the user to the edition, but rather to a page describing the edition at an editorial meta-level. In fact, all of the first three entry level items ('Home', 'About', and 'The edition') guide the reader to information *about* the edition and not to the edition itself. Apparently 'aboutness' is an important aspect for the editors. Taken as part of a scholarly argument then, this interface argues that for any scholarly edition it is essential to argue about the edition, more so than it is to get to the edition.

Nielsen's eye-tracking study also showed that visual elements of an interface receive a lot more attention than textual elements. JA is an interesting case in this respect as it features two prominent visual 'markers' on its front page, neither of which falls neatly into the category either of 'image' or 'text' – these are the representative images of Austen's manuscripts. When the page is viewed on a screen with dimensions of 1440x900 pixels (a fairly average screen size at the present time, and on the large side for 2010), the image of the manuscript featured on the front page takes about 10% of the screen real estate, which is, we would argue, a shade under 'sizeable'. The prominence afforded to the image seems to suggest that "manuscript" is somehow an important asset to this digital scholarly edition. Far less important, one gathers, are the institutional aspects of the project. The logos of the institutions involved are not visible on the average landscape-orientation monitor without scrolling down.¹

At the same time that the edition foregrounds the importance of manuscripts and relegates the institutional identity of the editors to the background, we perceive ambivalent clues as to the practice of scholarly editing itself. The banner at the top of the page is revealed to be, upon closer inspection, not a careful representation of one precious manuscript, but rather a juxtaposition of fragments derived from images of several of Austen's manuscripts. It includes an image of the name, or possibly the signature, of Austen herself as well as a pair of excerpts, each easily traced from the search function provided and identifiable respectively as page 1 from the Sanditon manuscript and page 44 from a notebook called "Volume the First". What does this combination mean? The particular selection, which may initially appear arbitrary, gains some meaning for readers with a passing familiarity of Austen's career, as it represents the span from the earliest of her juvenilia to the novel she was working on when she died.

¹ They are, in fact, immediately visible on portrait oriented screens, but we will observe other properties that indicate that this edition was not primarily intended to be used in portrait orientation.

JANE AUSTEN'S FICTION MANUSCRIPTS

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Home

The **Jane Austen's Fiction Manuscripts Digital Edition** gathers together in the virtual space of the web some 1100 pages of fiction written in Jane Austen's own hand. Through digital reunification, it is now possible to access, read, and compare high quality images of original manuscripts whose material forms are scattered around the world in libraries and private collections. Unlike the famous printed novels, all published in a short span between 1811 and 1818, these manuscripts trace Jane Austen's development as a writer from childhood to the year of her death; that is, from 1787 (aged 11 or 12) to 1817 (aged 41). Not only do they provide a unique visual record of her imagination from her teenage experiments to her last unfinished writings, these pages represent one of the earliest collections of creative writings in the author's hand to survive for a British novelist.

The main resources in the digital edition are the manuscripts themselves, accessed through the manuscript menu and grouped chronologically and according to their material states as fair copies (the *Juvenilia* and *Lady Susan*), working drafts (*The Watsons*, *Persuasion*, *Sanditon*), and further materials. Each manuscript can be opened in a variety of ways: as facsimile pages which can be magnified using 'zoomify'; as transcribed text set side by side with the original manuscript page; or through a Headnote that provides details of the manuscript's history and physical description. Click on [Manuscripts](#) in the main menu.

To discover the editorial principles behind the edition and the technical details of how it was assembled, click on [Edition](#).

To find out about the AHRC-funded project that underlies the edition, click on [About the Project](#).

Click on [Search](#) to find the usage and occurrence of particular words and phrases across the whole body of the manuscripts.

The digital edition was updated on **31 July 2012** to reflect the change in ownership of the larger portion of the manuscript of *The Watsons* (see [Head Note to The Watsons](#)) and to address issues that had arisen in the alignment of transcriptions owing to adjustments in the size and display of the Georgia font.

Jane Austen's Fiction Manuscripts is a three-year AHRC-funded research project. It is a joint project of the [University of Oxford](#) and [King's College London](#).

Arts and Humanities Research Council UNIVERSITY OF OXFORD KING'S COLLEGE LONDON BODLEIAN LIBRARY

Figure 2: Front page of the *Jane Austen Fiction Manuscripts* Edition.

An observation to be made at this point is that there is no such thing as 'just an illustration': even an image that was most likely not consciously intended to allude to the argument of the edition impels and influences interpretation after all. But what does this banner argue? It does not seem to subscribe in any case to the virtue that McGann (217) sees in the 'impossible truth' of 'philological fact', as it clearly reworks its facts into an alternative truth by superimposing them. Should this be taken to argue that textual and documentary editing make do with less assiduousness and rigour concerning their facts than do other scholarly disciplines? Perhaps it argues that facts are indeed constructed and reveal, at most, perspectives (Gitelman and Jackson, Betti). Or perhaps it argues that digital scholarly editions should be understood foremost as a site of interaction and engagement: the reader-user is invited to ponder the significance of the few lines of manuscript in that banner. Indeed, using the search function to pinpoint their location and provenance brings the user deep into the edition within mere minutes.

As the user is lured into interacting with the JA interface, further interesting observations can be made. The two primary points of entry on the front page are the 'Manuscripts' and 'Search' items on the horizontal menu bar. These are (as is the site in general) not particular strongly contrasted against their background –

indeed, visually impaired or colour-blind users might miss them altogether. This is surely an unintended side effect, but again: the argument is in the eye of the beholder. Clicking through to either of these entry points brings the reader-user rather *in media res* within the digital edition. Neither page offers much contextualization of the materials, resources, and affordances that are offered to the reader-user. This may, again, be understood as an implicit argument that the reader should be invited and enticed to explore the edition on his or her own, which would be congruent with poststructuralist ideas with broad appeal within digital scholarship, that it should be an exercise for the reader to create his or her own text and edition (Burke; Robinson, *Five desiderata*).

Once inside the edition itself, the JA interface is unobtrusive, perhaps even minimalist. It suggests a desire that the interface recede into the background, leaving as much space as possible for attention to the manuscripts themselves. For instance, a search for “madam this is not to be borne” produces a very plain results list; clicking on the appropriate entry brings the user to the particular page of the manuscript that contains the text, with the transcription alongside (fig. 3). Transcription and facsimile are also presented in a plain, almost sparse style, which leaves most of the screen estate and user attention for the manuscript, the text. This could be interpreted as an argument for reading the text in solitary concentration. In the absence of convenient support for comparison (see below), it could also be seen as a ‘Cerquiglinish’ argument for full attention to the individual text witness.

That said, the interface also signals some neglect of the text itself. Each page includes a link to a “Head Note”, which takes the user-reader to a presentation of information on the context, provenance, materiality, and so on of the manuscript to which the page belongs. This head note, however, provides no direct link back to the referring page of the manuscript; the only way forward for the user is to start over with the document’s first page. In this sense, the editor seems to have rather brutally abandoned consideration of the user’s experience of the text. This sensation of isolation of the text is amplified by the fact that the contextualizing head note has a structured table of contents to the left of the screen, providing quick access to all other sections of the website *except* for the meat (as it were) of the edition: that is, the transcriptions and facsimiles. Instead, it provides many points of entry to all the edition’s sections, site pages, and information *about* the text(s), manuscripts, and the edition.

There is another quirk of the interface that interferes with the argument that the text is the main point of attention. When a user-reader centres the text vertically on his or her screen and clicks through to the next or previous page, the vertical position is lost and the screen moves to the top of the web page again. It is as though a person is reading a print book on a desk in a library, with a librarian pushing the book toward the bottom of the desk each time a page is turned. This effect is only avoided with



Figure 3: *Jane Austen Fiction Manuscripts*, transcription/facsimile example.

vertical screen resolutions of more than 1050 pixels, which means that some 70%² of users experience this disorientating jump as they try to page through the text. Taken as argument, the effect of this quirk is to diminish the resolve of the interface to treat the text as central or essential. The interface thus argues both for and against the centrality of the text.

Although the text is placed, for the most part, at the centre of the argument of this interface, comparison of texts is not a function that is deemed important for this digital scholarly edition. There is no option provided to display different transcriptions or facsimiles alongside each other. It is, of course, possible to open a separate window (either by oneself or using the convenience option built in for facsimiles) but this increases the risk of further issues with screen estate, which in turn makes comparisons rather bothersome for users.

² This number can be quibbled about. It is based on the January 2017 statistic from W3Schools (www.w3schools.com/browsers/browsers_display.asp) which shows that at least 23% of internet users have a vertical resolution of 1050 or over. There is a residual category, representing 7.6%, of undefined higher resolutions for which it is unclear whether they are over or under that number. For the sake of argument, we can summarize this as '30% have a vertical resolution over 1050 pixels'. There is, however, an argument to be made that people working professionally with digital text and documents might have larger screens on average. Even so, it is hard to imagine the number would be more than 50%. Moreover, we do not necessarily argue only for professional reader-users. It is arguably even more important to consider the experience of non-professional readers, more of whom will likely suffer this effect.

That the only option to compare texts is to open additional windows also serves as an indication that JA is not geared towards tablet use (including the portrait orientation capabilities of these) since most tablets are not well tuned to displaying multiple browser windows in parallel. It is also worth noting that JA's purpose-built magnification viewer for the facsimile images does not work on mobile devices. All this is despite the fact that tablet devices are an increasingly popular means to engage with textual resources for the general public as well as professional scholars. Interpreted as an intentional argument, the lack of tablet computer support could mean that the intended audience for the edition is not a general audience interested in Jane Austen's work, but specialists working at a laptop or desktop computer equipped with large screens.³

In summary, JA seems to conceptualize the digital scholarly edition on two planes. The first is a plane or a site that is concerned with *aboutness*. This is where the edition as a whole, the editorial work, the context of the manuscripts is explained and where scholarly knowledge, pontification, and information about the text and scholarly editing are apparent. The second plane, one that gives space solely to the texts in transcription and facsimile form, gives the impression of being much more sequestered, isolated, and focused, yet with odd quirks that interfere with the impression that it is intended to emanate concentration and topicality. We could thus assert that JA argues for a digital scholarly edition that has separate and distinct concepts of text and paratext; its provision of the transcriptions and facsimile in a secluded space argues that they are primarily intended for reading, as comparison is rather cumbersome and there is no allusion to other forms of analysis beyond search.

This inferred argument clearly operates at the level of the scholarly digital edition as a whole, but does it also pertain to the text in question? Should the atmosphere of secluded and intimate reading that emanates from the interface be taken as a statement by the editors that these manuscripts and notebooks were (to be) used in precisely this way? The interface is not explicit about whether this seclusion and focus pertains only to the edition itself or whether it also applies to the originating texts. To be fair, the argument of how the original manuscripts were to be used is a complex and often unanswerable one for the vast majority of texts.

Having made our observations, we can now turn to the statements that the editors explicitly make about their interface and consider what these say to us. Only one such statement can be found:

³ Another, perhaps more likely, explanation is that this edition was designed prior to 2010 and that tablet use was therefore not yet a real consideration. We have here omitted a detailed treatment of the interaction between interfaces and the rapid pace of technological change that underlies some of them. This example nevertheless serves to make very clear that, even if a message was intended differently at the time of its publication, the context of its reception can be very influential.

The core information about the text is applied by means of a system of XML ‘tags’ that encode parts of the text, and any ‘visualisation’ of the text that is required for publishing purposes is then produced in a separate process. This is particularly useful in humanities scholarship, because it allows academics to concentrate on the structure and content of the source materials, and issues around scholarly interpretation of the text, leaving issues of presentation to the later publication processes (JA > The Edition > Technical Introduction).

This seems to indicate that the textual scholars hold that presentation, interface, and interaction are not essential for digital scholarly editions at all, at least not from the perspective of scholarly editorial activity. Indeed, the rationale for the edition offered by the editors pertains exclusively to a functional level. Their primary concerns are the access to the manuscripts and their current material state. On the former point, they stress several times that through “digital reunification, it is now possible to access, read, and compare high quality images of original manuscripts whose material forms are scattered around the world in libraries and private collections” (JA > The Edition > Introduction). On the latter, they note that many “of the Austen manuscripts are frail” so that “open and sustained access has long been impossible for conservation and location reasons” (JA > About the Project). The edition thus provides “for the first time full descriptions of, transcriptions of, analysis of, and commentary on the manuscripts in the archive, including details of erasures, handwriting, paper quality, watermarks, ink, binding structures, and any ancillary materials held with the holographs as aspects of their physical integrity or provenance” (JA > The Edition > Introduction).

The text and paratext provide a few more clues as to how the editors and designers thought the interface would support their argument. The technical introduction (JA > The Edition > Technical Introduction) concerns itself primarily with which digital technologies and code libraries were used for the implementation of the edition. It also lists two specific JQuery user interface components that were used (‘draggable’ and ‘accordion’).⁴ We can see these components in action on the transcription and facsimile for the second page of the ninth quire in the manuscript of an unfinished novel, posthumously titled ‘The Watsons’ by James Edward Austen-Leigh (JA > Manuscripts > The Watsons). Jane Austen pinned a patch at this point in order to record a substantial revision to the text; in the interface, the patch has been represented as a collapsible ‘accordion’ section in the transcription and as a draggable facsimile that the reader-user can move across the screen (fig. 4).

From this we can infer that the editors and designers of JA at the very least regarded interface as a means to draw attention to the materiality of the manuscripts. Another viable technical solution would have been to represent the inserted page as ‘just’

⁴ jqueryui.com/draggable, jqueryui.com/accordion.

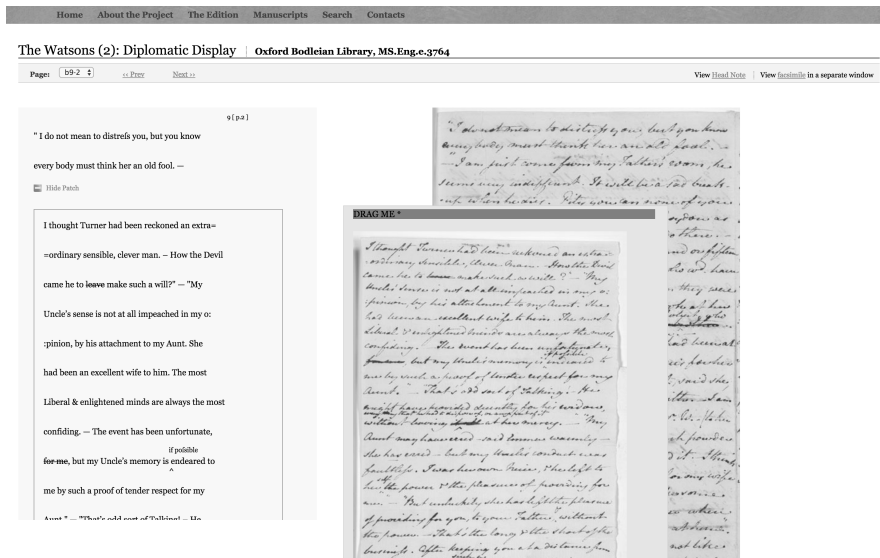


Figure 4: *Jane Austen Fiction Manuscripts*, example of patch.

another digital page to leaf through, with a note to record the pin-prick evidence of its intended placement; instead the editors took the considerable added effort to represent the patch in a way that appealed more to their observation of the material state of the manuscript, and that was more in accordance with their intention to enable the user to “compare the forms and texts of these dispersed manuscripts – their different physical construction, shifts in handwriting and presentation – to examine passages of erasure and revision” (JA > The Edition > Introduction).

Given these explicit indications, the editors and designers seem to appreciate the interface primarily as a means to represent and argue the significance of the materiality of a manuscript. Yet, our examination of the interface, unprimed by any knowledge of these editorial ideals, suggested instead that the interface was intended to argue for a strong distinction between original text and scholarly epitext. The act of reading the manuscript (and transcription) seemed to be foregrounded by means of the interface. Yet it appears that the editors did not intend the electronic edition to be a reading device at all: “At a later stage, the *print* edition will synthesize within a reading space the analytic functionality of the *electronic* and will be enhanced by richer annotation, discursive essays on the genesis and composition of the manuscript works, and consideration of their relationship to Austen’s printed fiction” (JA > About the Project > Output and Dissemination; emphasis ours).

We thus find that the reader-user and the scholarly editor may have very different interpretations of how and what the interface of a scholarly edition argues. This is obviously not a terribly surprising finding. There can always be a gulf of difference between that which an author intends to express and the meaning with which a reader endows the author's text (cf. e.g. Compagnon 29–65). Congruently, the interpretation by a reader-user of the argumentative contribution of a user interface may be very different from what its designer intended. This should not throw us off balance, but textual scholars must be aware of these “interface effects” (Galloway vii). To regard any interface as a neutral and objective pathway to engagement with a text is to turn a blind eye to a major site of argumentation and interpretation.

Meaning is conveyed not by functionality alone, but also by look and feel. We have noted already that JA's minimalist design seems to want to be in the way of the reader-user as little as possible, whether or not this was the intention of the designers. One wonders if this was the most adequate choice or the choice closest to the argument the editors intended to make (for indeed they had an argument to make): that in “contrast [to the print editions of her work] the manuscripts available to us, all of them unpublished in her lifetime, literally present a different face. These are Jane Austen's teenage writings” (JA > The Edition > Introduction). The interface as it now stands gives a somewhat bland impression, one of old papers and settled dust. The youthful contrast could have been better elicited by a brighter and richer colour scheme, for instance, and the inclusion of Georgian-era design elements of fashion for the young.

5.2 Welscher Gast digital

Our second, shorter case study looks at the *Welscher Gast digital* edition. The medieval German text known as *Der Welsche Gast* is a work on courtly morals created by one Thomasin von Zerklare in 1215–1216. As part of the Thomasin-Projekt, a platform has been developed to publish a digital scholarly edition of the text (hereafter WG, reviewed by Klug). WG could not possibly paint a more different picture of an edition than that of JA. Where we found the Austen interface to be somewhat reticent, endeavoring to be out of the way of the user, the interface of WG remains boldly and assertively in the foreground.

The site's front page (cf. fig. 5) has a large (33% screen estate at 1440x900 pixel resolution) revolving pictorial banner, which rotates between four pictures of medieval manuscripts *in littera textualis* with very high-quality illuminations, and one picture of two people studying the manuscripts behind three computer screens. Much more than in the case of JA, this gives the impression of a grandiose opening, reminiscent almost of movie trailer rhetorics, compounded by the use of declarations such as “Mehr als eine Textausgabe” (“More than a text edition”) in the rotating banner. The

interface thus expresses a much greater level of self-awareness than that of JA, and suggests more of a concern with selling itself to its audience.

Applying the F-pattern to a visual scan of the page as before, it appears that WG is also more concerned with taking the text to the reader-user. The four left- and topmost menu items bring us immediately to the texts, or to descriptions that pertain more to the authorial aspects and narrative content of the text than to the documentary and bibliographical contextualization that JA provided. Scrolling down to the bottom of the page we find additional direct points of entry to the text itself.

Although the interface – next to plainly recommending the text – certainly facilitates getting to the text, being confronted with the text is a somewhat different matter. One portion of the ‘meat’ of this digital scholarly edition is found under the menu item ‘Handschriften’ (manuscripts) → ‘Mittelalterlich’ (medieval), where a list of manuscripts is presented; clicking on one takes the reader-user to a presentation of information about that manuscript and options for further exploration. Here the interface remains prominent, but the sleek and streamlined presentation gives way to a clutter of metadata. This should probably be attributed in part to the fact that WG relies heavily on the standardized infrastructure of the Heidelberg University library (Klug 2016), and we must allow that getting to the actual text will not be difficult for a textual scholar accustomed to similar interfaces. However, a general reader-user will have a harder time identifying the points of entry to the actual transcriptions and facsimile. If, for example, we opt to examine the first manuscript on the list (Cod. Pal. germ. 389), we can see within the list of contents an entry titled “3r–27r Teil 1” (which on most screens will only be reachable by scrolling down). Clicking on this, we are presented a facsimile viewer for all the pages in the manuscript, beginning with folio 3r.⁵ Several elements are added to the interface, including a navigation bar with a cornucopia of buttons and an option to display a visualization of the quire structure. Underneath this is an interface element that pertains to the specific facsimile on display and consists of four tabs: facsimile, transcription, image description, scroll, and overview.

Although WG argues that it intends to take the reader-user as close as possible to the text as smoothly as possible, the interface becomes more cluttered the closer we come to the actual text, making it difficult for a user who actually wishes to be a reader to know where to begin. The more straightforward (indeed more prescriptive, as a user who simply wishes to have a text to read would expect) entry points are concealed at the bottom of the page. The growth of interface clutter – dropdowns, buttons, indices, and charts – that appears upon closer approach to the text might

⁵ It should be noted that this virtual path through the interface is not stable. The ‘Welscher Gast’ interface keeps track of each user’s *state*, which means that if the same user-reader returns to the text viewer, s/he would find the viewer opens to the same tab that was last visited. For reasons of brevity we have left this particular behavior out of consideration.



Figure 5: Front page of the *Welscher Gast Digital* Edition.

intuitively make argumentative sense: the reader-user perhaps ought to want to know more about and do more with the text the closer he or she gets to it. Paradoxically, though, all these aids intervene and perhaps even interfere with the task of reading, as it is relatively easy to configure a view of the text that, although informative in many ways, is no longer reader-friendly in any sense (cf. fig. 6). There is a tab that is somewhat enigmatically labelled ‘scroll’ which, upon selection, reveals itself to be the entry point to perhaps the most conventional reading mode of all, in which all facsimile images are laid out continuously from left to right without the meddlesome intervention of most of the other interface elements.

Over and above the manuscript facsimiles and transcriptions themselves, WG offers additional interactions with the text and its elements (some of which remain works in progress) that will certainly be of interest to those who wish to explore the text, as opposed to simply reading it. In contrast to JA, the edition provides a synoptic view (classified under “Texte” rather than “Handschriften”, which in itself gives some idea of the editors’ working definition of “text”) that allows comparison of several manuscript transcriptions in parallel. Another notable asset is the provision of a rich annotation layer for the illuminations found in the manuscripts, which have all been meticulously delineated to identify the different characters, motifs, and scenes. A

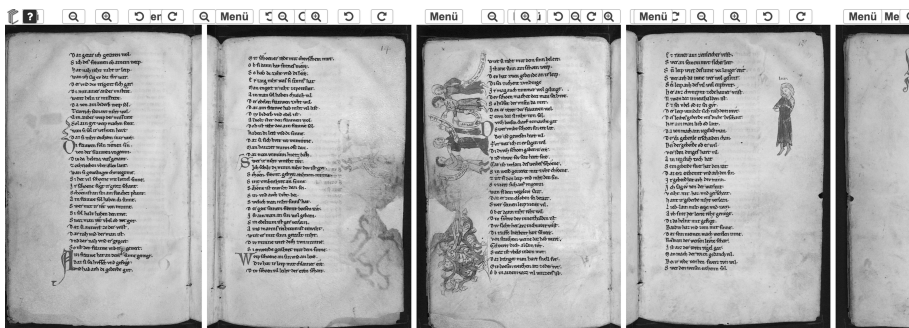


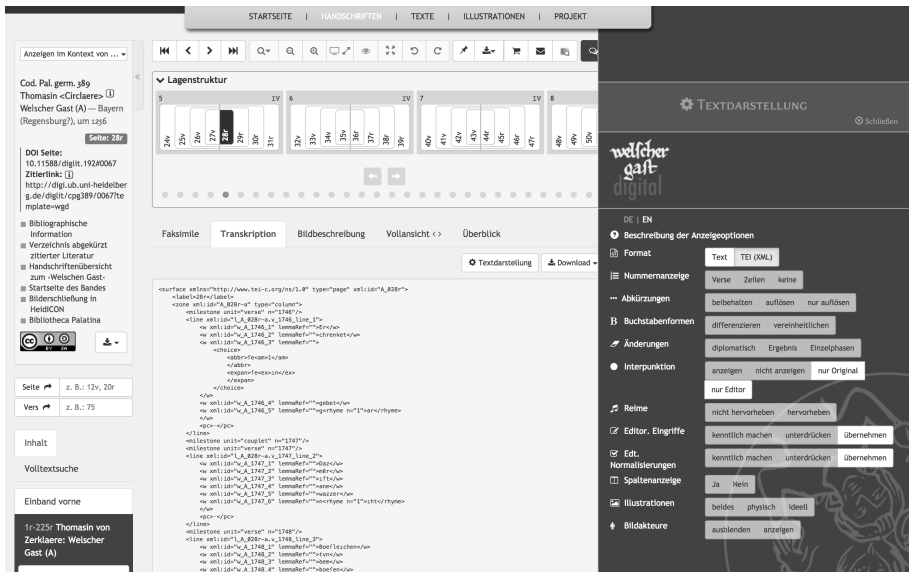
Figure 6: *Welscher Gast Digital*, horizontal full screen facsimile, continuous scroll.

force-directed network graph based on these annotations is available to illustrate and represent the relationships between the various ‘actors’ in the illuminations.

All of this adds to the impressive variety of points of engagement that WG wishes to hand to its reader-user. At the same time, it confirms a certain paradoxical nature of interface: as much as all this functionality adds ways to engage with the text, it also hides that text under an ever opaquer clutter of interface elements (cf. fig. 7). A large and impressive, almost daunting jumble of buttons, functions, drop downs, meta-data panels and charts clamour for the user’s attention. A straightforward argumentative interpretation of this situation might lead us to conclude that the editors believe that an edition should be, insofar as possible, in the hands of the user. Their means may defeat their ends, however: HCI literature suggests that, rather than the relation between the level of controls provided and the amount of control the user feels being proportional, a surfeit of controls may conversely instill a feeling of being unable to work effectively through the clutter (Krug 11–19).

WG certainly seems to argue that textual scholarship is a very complicated matter, requiring very complex skills. The manner in which this argument is made seems, however, to work in opposition to the (presumed) ideal of providing a text to the reader-user in a fashion as easily accessible as possible. WG indeed provides so many ways of tweaking and tuning the available data that it is actually quite easy to lose sight of the text of *Der Welsche Gast*.

Perhaps for trained textual scholars WG poses no real insuperable challenges. Its complexity might indeed appeal to these users, as it might mirror a certain complexity of the source texts that the scholar-user has conceptualised. Even so, the cluttered interface makes a definite argument: it stresses the complexity, the intricate structure, the manifold engagements that the editors wish to associate with the text. The stack of controls is there to bring out this complexity and to make it the focal point of

Figure 7: *Welscher Gast Digital*, maximizing functional elements.

the user's engagement with the text, which in turn affects the perception of the text whether the user actually engages this way with it or not. It is easier to imagine a deep structural interaction with the text through this interface than an aesthetic experience of connected reading. The various layers of control elements endow the interaction experience with a technical, mechanised feel – almost as though the *Thomasin-Projekt* has brought about a steampunk restyling of *Der Welsche Gast*. This mechanization is amplified by the fact that it is entirely possible to engage with the text without ever having a view of it that one might regard as a conventional view or a reading view, by switching to the provided TEI-XML perspective. This again sets WG very clearly apart from JA, within which it is impossible to lose the conventional perspectives on the text provided by the transcription or the facsimile. That WG allows conventional perspectives to be jettisoned completely from the user's experience speaks strongly to the idea that textual scholarship may treat data structures and markup encoding as textual witnesses in themselves, that code is itself text (c.f. Zundert and Andrews).

The paratext provided via WG unfortunately does not provide many clues about how the editors intended their interface to present the text or the edition. What is clear is that they have set a very high technical bar, as they wanted to produce no less than an exemplary edition: “das Projekt [soll] Modellcharakter haben” (“the project

[should] have the nature of a model”) (WG > Projekt > Ziele). For this, they have made it a point to apply state of the art technological toolkits and the *de facto* best practices that have emerged within digital textual scholarship to date. In so doing, they have realised a “Visualisierung der Transkriptionen [die] eine benutzergesteuerte und weitgehend anpassbare Textdarstellung [bietet]” (“visualisation of the transcription [that offers] a user-driven and extensively adjustable presentation of the text”) (WG > Projekt > Ziele) – the very plethora of instruments that we have observed, to adjust the text representation to the preference of the reader-user. As the editors point out:

Zudem ist jede Handschriftenseite dank permanenter Zitierlinks dauerhaft referenzierbar. Die Transkriptionsarbeiten sind noch lange nicht abgeschlossenen [sic!], einzelne Handschriftenteile sind jedoch bereits exemplarisch verfügbar. [...] Damit wird der Benutzer der Ausgabe das Bildmaterial in seiner Gesamtheit überblicken und im Detail studieren können. Eine Annotation mit kontrolliertem Vokabular (GND) soll sowohl den Text als auch die Bilder für Such- und Vernetzungszwecke erschließen. (WG > Projekt > Ziele)⁶

and:

Für die Visualisierung der Transkriptionen in Verbindung mit Digitalisaten wird eine Reihe von Darstellungsoptionen entwickelt. Aktuell sind folgende Einstellungen möglich: Anzeige von Vers- oder Zeilennummerierung, unterschiedliche Behandlung von Abkürzungen, Differenzierung oder Vereinheitlichung von Buchstabenformen, flexible Darstellung von Schreiberänderungen, wahlweise Einblendung der Originalinterpunktion, optionale Anzeige editorischer Eingriffe. Außerdem sind eine unterschiedliche Darstellung von Textspalten sowie die Hervorhebung von Reimen (wo bereits markiert) und die Absetzung von Verspaaren möglich. Bei diversen Elementen erscheint beim Anklicken ein Infofenster mit weiteren Angaben, etwa die Zeilenhöhe bei Initialen. Beim Vorhandensein von Illustrationen wird dies durch Balken am Textrand angezeigt, die mit Links zur Detailanzeige der Illustrationen versehen sind. Alternativ zur graphisch formatierten Darstellung hat der Benutzer die Möglichkeit, sich den TEI-Code (jeweils pro Seite) anzeigen zu lassen. Geplant ist die Bereitstellung von TEI- und PDF-Dateien zum

⁶ Moreover, every manuscript page is permanently citeable. The transcription work will not be finished for a long time yet, but individual manuscript portions are nevertheless already available as examples. [...] The user of the edition will thus have an overview of the collection of images and be able to study them in detail. An annotation with controlled vocabulary (GND) shall render both the text and the images accessible for search and linking purposes.

Download, auch für ganze Handschriften und für synoptische Ansichten.
(WG > Projekt > Methodik)⁷

The provision of so many configurable viewing options could be read as an argument that the text itself should comply with the reader-user's aesthetic wishes in preference to any editorially emphasised materiality of the text. More likely, it was intended to say that a user-reader should be enabled in every conceivable way to observe every textual and material detail of the text. The question, then, is whether the interface itself argues for or against this desire – whether it achieves such thorough affordance or ultimately frustrates the reader's ambitions. WG undeniably makes strong assumptions concerning the level of technical familiarity and philological training that its maximally-empowered users must have, and further assumptions on top of this concerning the extent to which these 'power users' (to borrow a phrase from computing culture) will welcome the demand for such deep engagement rather than being vexed by it. In the absence of an actual usability study of the interface, we must leave this question open, but initial impressions suggest that it requires a technically skilled textual scholar to use this interface effectively, and that even these skilled users will not easily have the option to step back from the deep engagement and simply read the text.

6 Conclusion: Towards a language of interface?

Having now, no doubt, antagonised the editors of a variety of digital scholarly editions by passing such strong and unexpected judgements on the form of their editions while paying only the slightest regard to philological substance, we will once more stress that the nature of these case studies was not to criticise or undermine the tremendous work and impressive substantive results that these editions represent. They were chosen for our 'game' precisely because they represent the state of the art in the field of digital scholarly editing, in terms of both philological thoroughness and technical excellence.

⁷ A range of display options are being developed for the visualisation of the transcriptions in connection with the digitisations. The following settings are currently available: Display of verse or line numbering, different handling of abbreviations, differentiation or normalisation of letter forms, flexible presentation of scribal changes, optional inclusion of the original punctuation, optional display of editorial interventions. Furthermore, a variable presentation of text columns is possible, as well as the accentuation of rhymes (where already marked) and the setting apart of couplets. Upon clicking on various elements an information window appears with more information, for instance, the line height of initials. If illustrations are present they are displayed in bars on the text margin, which function as links to the detailed display of the illustrations. As an alternative to the graphically formatted presentation the user has the option of displaying the TEI code (per page). The provision of TEI and PDF data for download is planned, also for entire manuscripts and for synoptic views.

What we hope to uncover with these “thick descriptions” (Wikipedia Contributors) is a glimpse of how interfaces argue, how they broadcast messages that the developer and even the user may not consciously hear, how the interface is never a neutral mediator entirely separable from that which is typically regarded as content. What precisely an interface argues, however, remains implicit because digital textual scholarship has not by any measure converged on a formal or even informal understanding of the argumentative meaning of particular interface design elements and properties. It is thus difficult to interpret clearly the argument that any particular interface tries to make. Does the maximization of functionality provided by *Welscher Gast digital* argue that the representation of a text is in the eye of the beholder, that it should indeed answer to his or her every aesthetic whim? Or does it argue that the primary purpose of a digital scholarly edition is to be a kind of textual laboratory, rather than simply a text – and does it argue that only for this specific edition, or for digital scholarly editions in general? Does WG’s sleek front page, which comes across as promotional, argue that the point of a scholarly digital edition is to engage any and every reader-user with the text and its edition? Or does the impressive and indeed daunting complexity of the functionality provided argue the opposite, that digital scholarly editions of texts are reserved for experts? How do we reconcile the staid and retiring interface of the Jane Austen fiction manuscripts edition with the materiality and “teenageness” (JA > The Edition > Introduction) of the documents that was a paramount aspect to which the editors wished to draw attention?

What we can infer from our limited case studies is that the argument an edition contributes through its interface is not entirely within the control of the editor or engineer, just as there is no one-to-one translation between the author’s intent and the reader-user’s perception of a text (Wimsatt) or, indeed, between a speaker and a listener. Certain arguments may seem straightforward, such as the provision of a plethora of tools to argue that the text deserves deep engagement, or a certain repertoire of visual elements (colours and images) to evoke a certain mood or context. These arguments are certainly shaped by the editor independently of the user – a bright colour scheme can convey an impression of unorthodoxy; a plethora of functional controls conveys the importance of engagement to the editor. Yet, whether or not the arguments reach their targets depends heavily on the interface literacy of the reader-user – on his or her ability to understand the signals and, in the case of functionality-as-argument, to wield the tools provided in a meaningful orchestration of engagement with the text.

This brings us to another observation: interfaces argue at different levels simultaneously, and it is not facile to judge exactly what the interface argues at each level. No interface can escape making an argument at a level of general usability: a fragment of text that is a hyperlink but is in no way distinguishable from surrounding text, for example, argues only a profound misunderstanding of any user’s needs and is,

on those grounds, a fairly universally recognised sin against usability. Yet, as we hope we have shown, interfaces also argue on the conceptual level about the digital scholarly edition, in both the specific and the general case. One interface argues restraint, rendering a single straightforward view of the text prominent and allowing other functions to recede into the background; another argues for a maximum of affordances, rendering a variety of versions that must be considered in symphony in order to approach 'the text'. The arguments can, of course, be paradoxical: more functionality in an interface suggests a text is important enough to be scrutinized in as many ways as possible, but in so doing it draws more emphasis to the tools than to the text. Another interface places a simpler experience of the text in the foreground, but only after the user has had to navigate layers of indirection before arriving there. A third level of interface-as-argument pertains to what the edition conveys about its specific text – for example, the aspect of carefree juvenilia in Jane Austen's manuscripts, which might have been underscored through the aesthetics of the text and edition display, had the editors wished to reinforce that particular message.

There is very little evidence in the paratexts of any of these editions that the editors have considered how their interfaces argue on any of these levels, or indeed how they argue at all; this is not tremendously surprising given the scarcity of specialised training or skill in user interface design within digital philology, and the lack of a shared literacy of graphical interfaces at large. In the absence of any such consciously transmitted semiotics, interfaces and their design are treated as sufficiently transparent, or perhaps sufficiently beside the point, not to warrant explanation or rationale. We hope to have made it plain that interfaces are neither transparent nor beside the point. The obvious next step would be to advocate that editors apply the rules of scientific accountability not only to their data, but also to their interfaces. Part of the process of establishing a semiotics of interface argument must be found in the explanations that editors give for their interface design choices in their own scholarly editions – that is, editors should make explicit the ways in which they intend their interfaces to argue and ensure that these arguments are congruent with their textual ones. This is not a call for loudly-proclaimed and unquestioned adherence to the usability guidelines that HCI and interaction design studies have derived over the last three or so decades, nor would we suggest that all editors endeavour to become professionally skilled interaction and interface designers. Rather, this is a plea for anyone responsible for the production of a digital edition to debate the decisions on interface that go beyond considerations of usability (e.g. Why is the banner a certain size? What informs the selection of pictorial content? Why is the page background blue? What determines the order of navigation items?) and thus explore and help to develop not simply the functionality but also a shared understanding of argumentative expressivity of interface in the realm of textual scholarship.

We realise the difficulty of our argument – to ask editors to justify their user interfaces so explicitly, given our limited understanding of how interfaces argue in the context of textual scholarship, amounts to asking the chick to explain the hen. User interfaces are a means of communication of a scholarly argument, and the decisions that go into their design are informed by the message or messages that the editor wishes to convey about the text. User interface design is a language that must be learned well in order to be used effectively. The creator of a digital edition must understand that language, but unfortunately the world of user interface design has, as yet, no grammar books or lexicons for this mysterious, mostly non-verbal language insofar as it departs from considerations of usability.

The alternative, however, is worse – if we agree that editors need not concern themselves with the skills necessary to make a well-argued and well-arguing user interface, we are saying that the scholarly argument of their edition can be reduced to the ticking of boxes. Or perhaps worse: to advocate for the development of a standard user interface for digital editions is to claim that all textual scholarship is, fundamentally, the same. And so we advocate instead, not for a set of guidelines or requirements for digital scholarly editions or their interfaces, but rather that editors explicitly consider the semiotic significance of any interface element they provide – to reflect on what aspect of the argument it expresses, and how that is adding to, or perhaps subtracting from, the argument they intend to make.

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The Editor in the Interface: Guiding the User through Texts and Images

Wout Dillen

Abstract

In a way, the Graphical User Interface (GUI) can be regarded as the digital scholarly edition's new paratext: not exactly part of the edited text itself, it still has an undeniable impact on the way the user reads and understands the edition. This makes the interface an important place for the editor to convey her views on the materials the edition has to offer. Therefore, this paper focusses on the role the editor of the digital scholarly edition plays in guiding the user through its data, and helping her shape her interpretation of those data – arguing all the while that it is exactly in the interface that these interactions take place. Starting from Mats Dahlström's proposal for digital scholarly editors to leave *Ariadne threads* to guide their users through the textual labyrinth of their digital scholarly editions, this paper suggests that Dante's *Divine Comedy* might make a more appropriate allegory for the editorial model. Taking a cue from Dante's 'Virgil' character, the editor may prefer to remain in the background of the edition, encouraging the user to be fully immersed in the edition's data – only to quietly step more and more in the foreground as the user moves deeper and deeper into the edition and could arguably use more explicit guidance. After taking a more theoretical approach to this topic, the paper illustrates the kind of editorial decisions that may be involved while designing a digital scholarly edition by taking the *Beckett Digital Manuscript Project* (BDMP) as a case study. Walking the reader through the many tools and functionalities the BDMP has to offer, this paper explains how this editorial model would apply to the project, focusing especially on the changes the edition's graphical user interface underwent as it was redesigned in November 2015.

1 Data or interface?

In her opening keynote to the *Digital Scholarly Editions as Interfaces*¹ conference, Dot Porter wore a T-shirt that read “data over interface”.² Quite the controversial piece of clothing to wear at a conference about interfaces, she used its slogan to argue that for the sake of the research, the data should always come first. That interfaces should not put limits on the data, and that we should be careful not to distort the data through the interfaces we build around them. A compelling point that helped set the right critical tone for the conference, and was echoed or adapted in many of the subsequent conference papers. And indeed, as a researcher it is difficult for me to disagree with this point, because I know that it is precisely through analysing the data and extracting the relevant information from those data that I can do my research. Without these data, there are no editions – be they digital or in print. The same cannot be said about interfaces.

Nevertheless, experience has taught me that sometimes it is by developing a Graphical User Interface around the data, by thinking critically about new ways of trying to present the data, and to present our interpretation of those data, that we can come to new insights about the materials we are studying. In those cases, it is exactly by reconfiguring our materials in new ways, by constructing an interface around those materials, by interacting with other people, and by seeing how the interface shapes *their* interpretation of the data, that we keep developing our own interpretations of those materials. This point was also made in Richard Hadden’s talk *More than a Pretty Picture*, when he asserted “you process your data, you visualise it, you learn from your visualization”. And indeed: data visualisations or interfaces are not the endpoints of our research, they are just the beginning. We use them to try to make a point about our data, and when that point does not come across in the way we wanted it to, we can either reconfigure our presentation of the data, or try to run with it and reconfigure our interpretation of the data instead. If we are lucky, we can do both, and make two equally valid and valuable arguments about our data instead of one.

At the *Digital Humanities Summer School 2013* organised at the KU Leuven in Belgium, Edward Vanhoutte suggested that the act of transcribing source materials into TEI-XML is an extreme form of close reading that almost always teaches us something new about the sources we are transcribing (Vanhoutte and Van den Brande). As a digital scholarly editor I wholeheartedly agree with this claim, and would go as

¹ As the reader of this volume will already have learnt, the title of the *Digital Scholarly Editions as Interfaces* conference in Graz left it to the presenters to decide whether they wanted to use their talks to discuss digital scholarly editions as Graphical User Interfaces (GUIs), as Application Programming Interfaces (APIs), or both. As will be pointed out below, this paper will only focus on the former: a user oriented interface designed to facilitate human-computer interaction that will (in our case) help the user navigate the contents of the edition in question.

² For the full text of the keynote see (Porter). This blogpost includes a picture of the T-shirt.

far as to extend it to include the development of Graphical User Interfaces as well. Much like transcribing, the task of developing an interface around these interfaces involves a specific and precise type of interaction with our data that may influence our interpretation of those data, and perhaps even propel our research further in new, unforeseen ways. By developing interfaces and playing with them by finding new ways to show the user, or even ourselves, what we want to say about our materials, we may learn more about those materials, adjust our interpretations, and strengthen our arguments. We should not underestimate the impact that the creative aspect of developing interfaces around our data has on our growing understanding of those materials. Linking this thread back to Porter's opening keynote, I would argue that even from a research point of view an argument could just as well be made for the slogan *interface over data*. Continuing on that thread, this paper will focus on the role the editor of the digital scholarly edition (DSE) plays in guiding the user through its data and helping her shape her interpretation of those data – arguing all the while that it is exactly in the interface that these interactions take place.

2 The editor as guide

In the digital age with its abundance of information, one of the most important roles of the scholarly editor is that of a guide: someone who can help the user grasp the full complexity of the materials the digital scholarly edition has to offer. A similar case was already made in the year 2000 by Mats Dahlström, in a paper titled *Drowning by Versions*, where he argued that a DSE “is intended to fulfil two perhaps contradictory user demands” (§4). On the one hand (1), there is a desire to give the user full reign over the edition's materials, and to provide her with the necessary tools to formulate her own interpretation about the many ways in which its different documents relate to one another. On the other hand (2), there is a strong urge to make full use of the editor's academic expertise and her experience with the materials in question, and to offer the user a first interpretation of these documents.³

Acknowledging that most editors will try to satisfy both demands to the best of their abilities, Dahlström nevertheless expressed his concern that by spending too much effort on the first objective, the editor runs the risk of neglecting the second. According to Dahlström, print editions in general focus more on the editorial aspects (1), while digital editions focus more on the archival aspects (2). And indeed, it can be argued that print editions tend to bury rivalling variants deep in a critical apparatus; while digital editions tend to bury the user in a seemingly endless collection of documents.

³ Now nearly 17 years old, this paper still seems quite relevant today, as Paul Eggert made a similar observation when he proposed a dichotomy between archival ('1') versus editorial ('2') impulses in digital scholarly editing in his keynote to the joint *DiXit 3 / ESTS 2016* conference in Antwerp (October 2016).

This is partly due to the medium, of course: the print medium is text-oriented, linear, and has a limited amount of space that forces the editor to be concise; while the digital medium is more visual, multidimensional, and virtually eliminates any spatial concerns. We *can* show the user all these beautiful documents in their full glory and high resolutions. So why *wouldn't* we? And surely offering the user the possibility to interpret the materials on her own can be quite tempting, as it absolves the editor to a certain extent from making difficult choices and taking responsibility for them.

But of course, for textual scholarship the mere digitisation of these source materials is not enough, in the same way that offering the user an unorganised pile of minimally digitised documents is not the same thing as making a digital scholarly edition. To be called a *digital* scholarly edition, the edition needs to be a *scholarly* edition first: it needs to be the result of textual scholarship, and make some sort of argument about the materials it holds.⁴ And indeed, it is important to keep in mind that the idea of a completely objective archive of textual documents is a utopia: creating an archive or edition will inevitably involve some sort of interpretation – an effort that already starts with the selection of the materials. That is why it is crucial that the editor acknowledges the part she plays in the development of the edition, and that she takes responsibility for her interpretation in the presentation of the materials – what Elena Pierazzo called “accountability” in her recent monograph *Digital Scholarly Editing: Theories, Models and Methods* (7). This makes the second objective at least as important for the edition as the first.

When he describes a possible solution for this problem – for allowing the two objectives to exist side by side – Dahlström recalls a well-known scene in classical mythology. Portraying the archive of documents in a digital scholarly edition as a textual labyrinth, he encourages the editor to act like a contemporary Ariadne, offering a number of distinct threads that can lead the user through the maze without getting lost. An apt metaphor, I think, that already calls attention to the need for the editor to incorporate some sort of guiding principle into the edition, to help the user find her way. Still, as editors, I don't think any of us like to think of our editions as labyrinths. The implication here is that, as a textual labyrinth, the edition would be overly complex and incredibly difficult to navigate. During my work on the *Beckett Digital Manuscript Project* as a Ph.D. student at the University of Antwerp, another metaphor suggested itself. Rather than the Greek myth, perhaps it is better to look

⁴ The principle that digital scholarly editions should strive to be scholarly editions first is not new: it has featured in definitions of digital scholarly editions at least from 1998 (Vanhouette 107) to 2016 (Sahle 26; 33). Similarly, nowadays the notion that an edition makes a scholarly argument about the materials it encompasses is also commonplace (see for instance Eggert 2013; Andrews and van Zundert 2016). In *Reading or Using a Digital Edition? Reader Roles in Scholarly Editions*, Krista Stinne Greve Rassmussen referred to this argument as “a statement that can be attributed to the edition” (124); and in *Maschinenlesbar–menschenslesbar. Über die grundlegende Ausrichtung der Edition*, Inga Hanna Ralle called it an “editorial narrative” (152; see also below).

at the edition and its relation to the user and the editor in terms of Dante's *Divine Comedy*.

At the very start of the poem's first canto, Dante's homonymous protagonist is scared out of his wits as he finds himself lost in a wild, impenetrable forest, with no way back. After dwelling aimlessly in the woods for a while, a faint voice reaches him in the dark, hoarse from long silence. It is Virgil who comes to Dante's rescue, guiding him through the forest and further still, all the while pointing out the many wonders that are hidden underneath the surface. If intertextual references are any indication, this must have been Beckett's favourite scene from the *Divine Comedy*. As Dirk Van Hulle has pointed out, allusions to the tercet (and especially its last line: "chi per lungo silenzio pareo fioco") recur time and time again throughout Beckett's works and notebooks (*Making of Samuel Beckett's Stirring Still*, 93; *Manuscript Genetics*, 148–156). This line suggests that because Virgil had been silent for so long – for centuries even – when he finally started speaking again to attract Dante's attention, his voice was hoarse, or faint (fioco). A source of inspiration for Beckett, it might serve as a more appropriate allegory for the editorial model behind the digital scholarly edition that is being developed around his works.

A key difference between the two mythologies is that while Ariadne had taken the necessary precautions before sending her lover Theseus into the labyrinth to slay the Minotaur, Dante, on the other hand, had set off on his trial absentmindedly and unprepared – so it was perhaps no wonder that he lost his way so easily. But when we are dealing with digital scholarly editions, perhaps getting lost is not always a bad thing. For an editor, the greatest compliment she can receive is probably when a user is so entranced by the curated documents that she loses herself in the materials completely. As editors, we should not be afraid to give up control and let our users roam free. It is their edition as much as it is our own, and you never know when a serendipitous discovery (like the mystical animals Dante encounters before meeting Virgil) may lead to an unexpected breakthrough or a new hypothesis about the edition's materials. At the same time, it is important that at the moment when the user *feels* lost, she can rely on the editor's experience to let her know where she is, and to lead the way to where she wants to go. Because on a computer, unlike in a labyrinth or enchanted woods, if things get too difficult, the easiest way out is still to close the application and move on – a scenario that the editor will want to avoid at all costs. Instead, this is precisely the moment when the edition should draw the user in further, encourage her to accept the editor's guidance and trust her expertise.

While this Dantesque simile may seem like wishful thinking, I think it can be a useful allegory to keep in mind while developing a digital scholarly edition. If grabbing the user's attention can already form a considerable challenge in itself, holding it is a much more difficult task still. If we want to allow for this kind of fruitful interaction between the user and the edition, I think the editor will need to

walk on a thin line between being *absent* on the one hand, and *too present* on the other. Like Virgil, the editor needs to be silent long enough to allow the user to be fully immersed in the edition, but eloquent enough to persuade the user to keep going when help is needed. To achieve this, the editor's voice has to be *faint* ('fiasco'), to appear in front of the user's eyes only when that user finds herself out of her depth. And I would argue this is exactly where the edition's interface comes into play.

3 The editor in the interface

So this interface, is it the editor's best friend, or her worst enemy? At the *Digital Scholarly Editions as Interfaces* conference, arguments were presented in support of either of these positions. The staunchest critic of the interfaces of digital scholarly editions was probably Peter Robinson, whose paper argued *Why Interfaces Do Not and Should Not Matter for Scholarly Digital Editions*. This point of view links back to a paper Robinson published in 2003 titled *Where We Are With Electronic Scholarly Editions, and Where We Want to Be*, in which he implored editors to put their data on the internet "in a manner that allows it to be appropriated by others, augmented, corrected, infinitely reshaped". As part of his plea for scholarly editors to give up control and open their edition's data up to other researchers and developers, Robinson here argues that it would be more useful to offer an API (Application Programming Interface) for the edition than to design a single, fixed interface around the materials – because this makes it easier for programmers and developers to reuse the edition's data. And indeed: it is important to keep in mind that while the interface allows the user to interact with the data through the tools that it offers, it also inevitably limits this interaction through the tools it omits. Nevertheless, this approach is strongly targeted towards a specific type of user: the *meta-user*, if you will.

In our paper *Digital Scholarly Editing within the Boundaries of Copyright Restrictions*, Vincent Neyt and I proposed a distinction between three types of users: *basic users* who stumble on the edition out of general interest and may be satisfied with simple browsing functionalities; *advanced users* who want to research the materials the digital scholarly edition has to offer, and access them in non-linear ways; and *meta-users* who want to use the edition's data for their own research, and query those data in new, unforeseen ways (Dillen and Neyt 787). This typology is similar to Krista Stinne Greve Rasmussen's proposed distinction between three different reader roles for digital scholarly editions: *reader*, *user*, and *co-worker*. And indeed: her concept of a *reader* (who is "mainly interested in scholarly editions as reliable academic versions of literary works") completely overlaps with our *basic user*; and her concept of *user* (who reads or *uses* the edition's information in a more interactive and intertextual way) overlaps with our *advanced user* (Rasmussen 127).

Having read Rasmussen's paper, in these two cases I now actually prefer her apt terminology over our own. But it seems to me that there is an unsurmountable difference between her *co-worker* and our *meta-user* that leads me to believe that the latter might complement Rasmussen's typology nicely, possibly in the form of a fourth reader role. For Rasmussen, the term *co-worker* "signals that [...] the reader in this role is likely to take part in the editorial work at some level" and that her contribution "forms a genuine part of the edition" (127). This implies that the *co-worker*'s contributions are always considered in function of the original edition. Using the same (type of) tools that are at the disposal of the edition's editorial team, the *co-worker*'s contributions would ideally eventually be integrated into the existing scholarly edition.⁵ The *meta-user*, on the other hand, is a user who wants to re-use the edition's data for her own purposes: to query or augment those data with tools that are not available to the original editorial team, and possibly to publish the results of this endeavour in the form of a new, independent scholarly edition.

I believe it is exactly this kind of transformation and appropriation of editorial data that Robinson sought to encourage (or at least cater to) in *Where We Are With Electronic Scholarly Editions*. Not bound by the limitations of the original edition's framework, the *meta-user* would be able to let her creativity roam free and build something new by re-using the edition's raw materials. And indeed, for these users, the edition's interface will often act as a *barrier*, rather than as a *gateway*, between user and data. In view of this paper's discussion, however, I would argue that while this is of course an important user-base to keep in mind when developing a scholarly digital edition, it does not constitute the edition's only users – probably not even its primary users.

If a (digital) scholarly edition can be interpreted as an argument about the materials it encompasses – as Tara Andrews and Joris van Zundert also proposed in their talk *What Are You Trying to Say? The Interface as an Integral Element of Argument* – the primary target audience for the edition will be the scholars the edition is trying to engage. This means that the users the editor will try to cater to first are not *meta-users* such as developers and programmers, but rather an edition's (*advanced*) users: (textual) scholars who already have some degree of familiarity with the material (or with *similar* materials), and now want to read, interact with, and perhaps even assess the edition's edited texts (and the editorial decisions that were made to constitute that text). These are users who are especially interested in learning more about the content of, and links between, the edition's individual documents, and about the implications of the editor's interpretation of those materials for our broader understanding of the text.

⁵ Perhaps *co-editor* (or even just *editor*) would be a more straightforward name for this reader role than *co-worker*.

For those users – who will not necessarily know how to deal with raw data or an API – the interface will be a friend, rather than an enemy: a means of interacting with the materials, and of assessing the editor's interpretation of those materials. This is what makes (web) design such an important aspect of the digital scholarly editing process: the interface is the first thing the user will notice, and it will determine the way in which she will read the rest of the edition – if indeed at all. That is why the edition will ideally need an interface that is both attractive and intuitive: attractive because it needs to draw the user in, and intuitive because it needs to facilitate rather than hinder the user's reading experience.

Intuitiveness really is key here; a good interface for a digital scholarly edition guides the user to the documents she wants to read without drawing too much attention to itself. Features and tools that are not self-explanatory will have to be explained elsewhere, and learning how to use them is an investment the user is not necessarily willing to make. While writing elaborate documentations and tutorials is an indispensable part of digital scholarly editing that can help more experienced users unlock the edition's full potential, users may want to play around with the materials first, *before* deciding whether or not to read the edition's complete user manual. For these users, it is important that the edition's most basic and distinctive features are readily available exactly where they expect to find them. This can range from project-specific functionality questions such as how to switch between different document-oriented or text-oriented views, to more basic lay-outing concerns like finding the best place for a search bar, or deciding which icons to use for more common functionalities. For these questions, I would argue that the basic principle holds: the less time the user spends trying to figure out how the edition works, the more time she will be able to spend working with the edition.

At the same time, it is important to keep in mind that while making these design decisions, the editor is to some extent already steering the user's interpretation of the edition's contents. In this respect, the interface can be regarded as a second layer of editorial interpretation: after offering an interpretation of the edition's documents by transcribing them, the editor offers the user an interpretation of her transcriptions when she decides on how to present them. Stronger still, it can be argued that the visualisation itself is at least as important for conveying the editor's interpretation as the transcription on which it is based: as the main text the average (non-TEI proficient) user will come into contact with, the interface displays the edited text in a way that determines how the user will read and interpret the edition's documents. The same goes for the edition's navigation, lay-out, and its selection of tools. In a way, the interface is the digital scholarly edition's new paratext: not exactly part of the edited text itself, it still has an undeniable impact on the way the user reads and understands the edition. This makes the interface an important place for the editor to convey her views on the material.

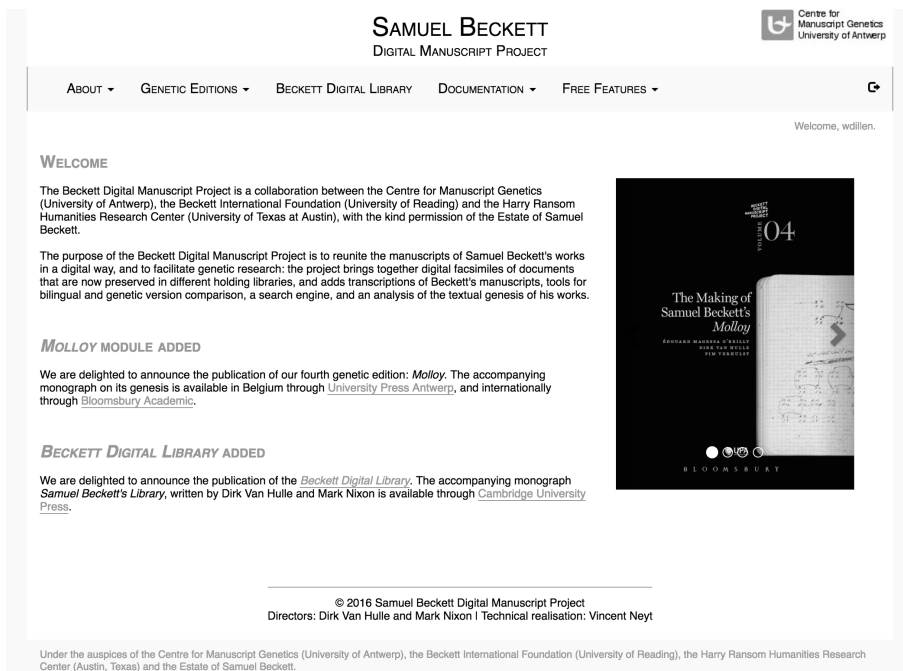


Figure 1: The homepage of the *Beckett Digital Manuscript Project* (BDMP).

4 Follow the interface

To illustrate the kind of editorial decisions that may come into play when designing a digital scholarly edition, I will refer to the *Beckett Digital Manuscript Project*, in the following abbreviated to BDMP (see fig. 1),⁶ an edition that had its interface redesigned in November 2015 – concurrent with the publication of a new module on Samuel Beckett's play *Krapp's Last Tape / La Dernière bande*. The BDMP is a hybrid genetic scholarly edition of Samuel Beckett's works – hybrid because it combines a digital with a printed component; genetic because it aims to digitally reunite Samuel Beckett's manuscripts and marginalia in view of retracing the author's writing process. Co-headed by Dirk Van Hulle at the University of Antwerp and Mark Nixon at the University of Reading, the project is a collaboration between the Centre for Manuscript Genetics (Antwerp) and the Beckett International Foundation (Reading) realised with the permission of the Estate of Samuel Beckett. Although I was kindly invited to

⁶ See: www.beckettarchive.org.

Figure 2: The BDMP's image view (Beckett *L'Innommable* MS-HRC-3-10: 01r).Figure 3: The BDMP's image/text view (Beckett *L'Innommable* MS-HRC-3-10: 01r).

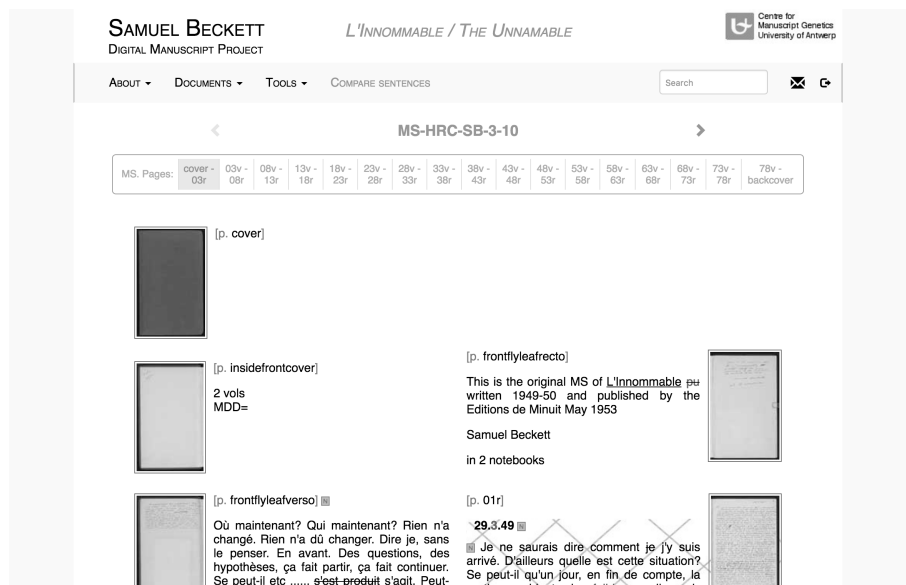


Figure 4: The BDMP's text view (Beckett *L'Innommable* MS-HRC-3-10).

take part in the editorial decision making process while I was working on my Ph.D. dissertation at the CMG, I should point out that the edition's new interface was developed by Vincent Neyt (the project's technical developer), and that the main incentive behind this development was to safeguard the website's performance as the edition continues to expand. Still, at the same time this decision gave the team a great opportunity to rethink the edition's interface from an editorial perspective, and perhaps to improve the way in which the editors used that interface to convey their interpretation of the materials the edition has to offer. Before we can go into detail regarding the way the interface has changed, we should first have a closer look at the basic tools and functionalities the BDMP provides. When you arrive on the BDMP's home page, selecting a *Genetic Edition* in the navigation bar will direct you to a catalogue of the archive's relevant documents (i.e. different draft materials). You can then click on one of those documents to be directed to a document description page, with more information about that document (e.g. on where to find the physical document, what the document contains, and who edited it for the BDMP), as well as a list of thumbnail images representing each page in the document. Clicking on one of those thumbnails in the genetic map directs the user to its facsimile images – to what is called the *image* view (see fig. 2). There, you can take a closer look at the

edition's high-resolution images by selecting the *zoom* view instead. Still, even with this option, Beckett's handwriting can be difficult to decipher. To help the user read the text on the documents, the project therefore also offers an *image/text* view that allows the user to select a zone on the facsimile, hence opening its transcription in a pop-up window (see fig. 3). For this view in particular, the nature of the materials (and specifically, the legibility of their text) determines the extent to which the document is subdivided into zones. For typescripts, for instance, where most of the text is clearly legible, the *image/text* view only offers transcriptions of less legible passages (e.g. deleted text, handwritten additions, or metamarks). Conversely, for drafts that are written entirely in Beckett's hand, this view will offer transcriptions of all the text in the document. For even more ease of reading the text on the documents, the BDMP also offers the user the option to leave the facsimiles altogether, and to read the editor's linear transcription of the entire document in the *text* view instead (see fig. 4). Finally, one of the BDMP's most important features is called the *synoptic sentence* view. By numbering all of the sentences of each work in the XML encoding, the BDMP allows the user to grab any sentence, and generate a chronological list of all versions of that sentence in this view (see fig. 5). That way, the reader can retrace the textual transmission of each individual sentence as it evolves throughout the writing process.⁷ From that page, the user can send a request to collate any number of those versions through CollateX (see fig. 6). By grouping together the variant and invariant parts of the sentence, CollateX provides a clear overview of the sentence's genesis that highlights the changes it underwent throughout the writing process.

In these different views, the user also has the possibility to manipulate the visualisation of the transcribed text to some extent, by selecting a tool in the navigation bar. The *place indications* tool conjures more information on where additions are located in the manuscript in the running text of the transcription; *writing tools* helps the user distinguish between the different writing tools that are used in the draft (e.g. different colours of pens, pencils, or typewriter ribbons) – potentially allowing the user to differentiate between individual revision sessions or even hands in the

⁷ As a bilingual author, Samuel Beckett wrote some of his works in English, and others in French. For most of his works, in whatever language the original was written, he himself would later translate it into the other language. As a result, the BDMP's archive of drafts is bilingual too, and the synoptic sentence view offers draft versions of individual sentences in both languages. In other words, in the synoptic sentence view of an individual sentence, you will find its first drafts in English, for example, read how it was copied and modified in subsequent versions up until the moment the text was first published in English, and then see how the sentence was translated in a first French draft, and subsequently modified further up until the moment the text was first published in French. Running all these different versions in different languages through CollateX would be useless, as it would only turn up invariants (as each translated word would be considered a 'variant' to its original). That is why the synoptic sentence view offers the possibility to collate all the different versions of individual sentences in *either* the English or the French text – and never both languages simultaneously.

SAMUEL BECKETT
DIGITAL MANUSCRIPT PROJECT

L'INNOMMABLE / THE UNNAMABLE: DEMO

Centre for Manuscript Genetics
University of Antwerp

ABOUT ▾ DOCUMENTS ▾ TOOLS ▾

Search

SYNOPTIC SENTENCE VIEW: SENTENCE 9 prev | next

> Compare all French versions of this sentence with CollateX
 > Compare all English versions of this sentence with CollateX

Versions

L'Innommable Segment 9, version 1 (MS-HRC-SB-3-10, p. 01r)

Se peut-il qu'un jour, en fin de compte, la pratique aidant, la faiblesse, j'y sois simplement resté, au lieu de sortir, selon ma vieille habitude, passer la journée et une grande partie de la nuit aussi loin que possible de chez moi?

L'Innommable Segment 9, version 2 (MS-HRC-SB-3-10, p. frontflyleafverso)

Se peut-il etc

L'Innommable Segment 9, version 3 (Minuit 1953, p. 7)

Figure 5: The BDMP's *synoptic sentence* view (Beckett *L'Innommable*).

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ABOUT ▾ DOCUMENTS ▾

Search

◀ back to Synoptic Sentence View prev | next

COLLATEX RESULTS: [0009]

variant, invariant.

☒ Version 1
 ☒ Version 2
 ☒ Version 3
 ☒ Version 4
 Recollate

Version 1: MS-HRC-SB-3-10	Se peut-il	qu'un jour,	en fin de compte, la pratique aidant, la faiblesse	, j'y sois simplement resté
Version 2: MS-HRC-SB-3-10	Se peut-il	etc		
Version 3: MS-1953	Se peut-il	qu'un jour,	premier pas va	, j'y sois simplement resté
Version 4: MS-1971	Se peut-il	qu'un jour,	premier pas va	, j'y sois simplement resté


 Collatex is a software collation tool developed by the Interedition Development Group. Go to <http://collatex.net/> for further information.

Figure 6: The BDMP's implementation of the *CollateX* tool (Beckett *L'Innommable*).

draft; *top layer* deletes all the deletions in the draft, while keeping all the additions – thereby allowing the user to read the final state of the draft’s version, warts and all; and *default transcription* reverts the transcription back to the default settings, without any of these user-generated textual manipulations. Finally, there is also the *compare sentences* tool that visualises the reference numbers for each sentence in the manuscript in the running text of the transcription – and clicking on such a reference number will direct the user to the *synoptic sentence* view.⁸

In the old version of the BDMP, there were two more tools (or rather: *toggles*) the user could use to manipulate the transcription. *Metamarks on/off* allowed her to choose whether or not metamarks were visualised in the transcribed text, and *notes on/off* did the same thing for editorial notes. In the new version of the website, these options are no longer available, and both are always visualised. For *metamarks on/off*, this was because by 2015 these were transcribed more consistently (all metamarks were now transcribed, preferably using standardised HTML entities), and more conventionally (following the 2011 publication of the TEI’s P5 v2.0 guidelines that introduced the `<metamark>` tag, among others).⁹ It was argued that especially in a genetic edition, metamarks form an intricate part of the text, and should therefore be present in that text’s transcription. For the notes, these were found inconspicuous and conventional enough not to break the flow of the text, so that providing the option to hide them arguably became dispensable.

With the exception of these last two *toggles*, all the different views and tools were available in both versions of the BDMP’s interface. So what else changed since November 2015? In general, it can be argued that the edition moved towards a more minimal interface – visualising only what is strictly relevant in a given context. This was both beneficial for the overall performance (as it helped solve a great deal of redundancy issues) and also helped the editors take a step back and get out of the user’s way. As Dana Wheelles’ usability study of the *NINES* project’s interface demonstrates, a website’s most attractive features can function as its greatest distractions when they stand in the way of the task at hand. For the *NINES* project for instance, eye-tracking software revealed that after querying the project’s data, the user’s attention was invariably drawn to a tag cloud in the left margin of the screen, rather than to the list of the requested search results that were displayed at the screen’s centre (396; see also 397 fig. 4). This led the project’s developers to remove the tag cloud from the search page altogether, as well as from other pages where it may be considered a distraction (398). This is a good argument against sacrificing too much screen real estate to what

⁸ Alongside these tools that manipulate the rendition of the text’s transcription, the BDMP also offers other functionalities, such as a search bar, a button to leave a comment on the transcription of any document page in the archive, or the option to visualise the document’s XML encoding.

⁹ Making the XML transcriptions of the BDMP’s documents more conventional and consistent like this involved some minimal retroactive updating of the transcription files.



Figure 7: The *quick links* as they appeared in the BDMP before the interface was redesigned in 2015 (Beckett *Stirrings Still* MS-UoR-2933-1: 1r).

are essentially popular, flashy gimmicks: by removing these unnecessary distractions from the page, the user can focus on the materials themselves, and become more immersed in the edition's core features.

At the same time, the user will, of course, need to know what the edition is capable of, if she wants to take full advantage of the tools the edition has to offer. Attending to this matter, the BDMP offers a link in its menu bar to the edition's documentation that explains how the user can view and manipulate the data. Still, as I already suggested in the previous section, editors should not take for granted that the users of their editions will actually start to read this information – let alone that they read *all* of it. Instead, it is essential to make sure that the edition's most important features are readily available to the user. In the BDMP's old version, this was what the *quick links* section was for (see fig. 7). On each of the different views, a number of buttons were displayed at the right hand side of the screen at a fixed height, staying put when the user scrolled down to the bottom of the page. The buttons were partly hidden: the first few letters of each button's caption were shown, but the rest seemed to be falling off the screen. When the user hovered over the buttons, an animation made

them expand until their entire title was visible. Clicking on one of the buttons would activate it, as indicated by a check mark that appeared right under the button's title, and remained visible when the button receded again. Exactly which of these buttons were available at a given time depended on how relevant they were for the view the user consulted.

As a more document-oriented visualisation, the edition's *image*, *zoom image*,¹⁰ and *image/text* views only offered quick links for the *search* and *compare sentences* functionalities. As a more text-centred visualisation, the *text* view, on the other hand, also offered quick links to the tools that allowed the user to manipulate (or reset) the transcribed text: *default transcription*, *place indications*, *writing tools*, and *top layer*. The *synoptic sentence* view, finally, offered quick links to all of these tools, except for the *compare sentences* tool, of course, because all the sentence versions in this view essentially have the same reference number (which is also referenced at the top of the page). To some extent, we can already see the *faint voice* of the Virgilian editor here. When the user was exploring the edition's documents on her own, the quick links blended into the edition's background (even using a similar background colour), retreating to the margins of the screen where they took up as little space as possible, giving the reader the opportunity to do her research without any unnecessary distractions. But when she required them, these editorial suggestions were right at her fingertips, ready to materialise in front of her eyes, filled with links to relevant tools and ways to manipulate the text to suit her needs. And, crucially, all of this was possible without navigating away from the page that caught the user's attention – allowing the editor to draw her further into the edition, instead of leading her out of the maze like Ariadne would.

But still, the mere presence of these buttons (partly concealed as they may have been) could have been a distraction to the user, tempting her to focus not on the text, but on the tools she could use to manipulate the text. And although the availability of specific quick links was related to their relevance to a specific view, it didn't make the available links any less redundant. In each of the views, all of these tools (even the less relevant ones) could also be activated in the menu bar (see fig. 8) at the top of the page – making the quick-linked tools available in two different places at once, which may confuse rather than help the user. These are some of the reasons why the quick links have disappeared in the new version of the BDMP's interface. The reason

¹⁰ The fact that the *image* and *zoom image* views enabled the option to *compare sentences* is counterintuitive because these views did not offer any transcriptions that could be manipulated in the first place. Clicking on the link would, therefore, involve a double transformation, where the user was first directed to the *image/text* view and the *compare sentences* would subsequently be automatically activated there. This functionality has been removed from the new version of the BDMP's interface. The user now has to move to the *image/text* view herself to activate the *compare sentences* functionality, making her more aware of what is happening, and how she is manipulating the edition.

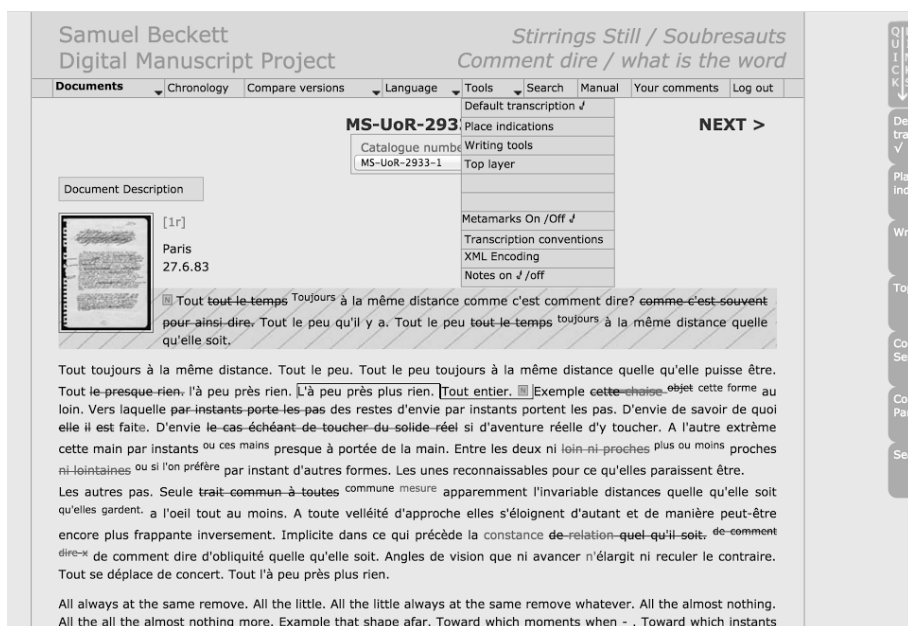


Figure 8: An example of the BDMP's menu structure before the interface was redesigned in 2015 (Beckett *Stirrings Still* MS-UoR-2933-1: 1r.).

why they existed in the first place is mainly because the tools they linked to were hidden in submenus and sub-submenus – places where the user is less likely to find them. This made some of the edition's most powerful tools invisible for the user at first sight. In the BDMP's new interface, this problem has been solved in a different way. Here, the menu bar itself has become more modular, adapting itself to the tools and functionalities that are relevant to the specific document the user is studying, and to the view she has chosen to do so. In other words, tools that are impossible to use in a given view (e.g. the *top layer* tool in a transcription-less view like the *image* view) are no longer available to the user. This has helped make the edition's functionalities more transparent by drastically reducing the number of (sub)menus in any given view, allowing for a more accessible and intuitive navigation through and manipulation of the documents and their texts by the user.¹¹

¹¹ For full disclosure, it should be stated that there are also tools that are only available for specific documents (rather than *views*). While working on a new *genetic edition*, the editors will assess how relevant and manageable specific tools and functionalities are for the documents in that edition. When the manuscripts of a given edition are especially difficult to read (as in the case of Beckett's final work

This arguably makes the interface less distracting, as tools and options only start to appear and become more and more prominent as the user moves deeper into the edition and, thus, may need more guidance. As such (connecting this description of the BDMP's new interface back to our Dantesque allegory), the Virgilian editor's voice becomes louder as the user travels deeper into the edition. At the same time, it is of course important to remember that the editor is always there, even in those views where there are only few tools at the user's disposal. Restricting the user's options is as much an editorial decision as expanding them would be. In the same way, highlighting some aspects of the edition over others in the interface can be a powerful way of guiding the reader through the available materials.

5 The power of suggestion

Another place in which the editor can highlight those aspects of the edition's materials that she finds particularly interesting is the search area. Perhaps one of the greatest advantages digital texts have over their printed counterparts is that they are so effortlessly searchable. Once it is transcribed and indexed, the text as dataset can be queried at the user's request, offering a list of results that is only mildly inconvenienced by factors like difficulty of handwriting and the complexity of the materials. What can be more difficult, however, is finding the *right* result in the list. To facilitate this, digital scholarly editions (like most websites) may offer advanced search options that help the user adjust the granularity of her search. The same holds true for the BDMP: at the edition's search page,¹² the user can narrow down the list of possible answers by specifying the work to which the query pertains, or even whether it should occur in an addition, deleted passage, or doodle description. But the editor

what is the word, for instance), the project may also offer a *topographical* view. This view erases traces of the author's handwriting and superimposes a transcription of those traces on the surface of the document instead – what Paulo D'Iorio has called an “ultra-diplomatic” transcription (52). Additionally, when the *topographical* view is available for a specific document, it is also possible to combine it with the *zoom* view in what is called the *topographical zoom* view. Rather than lifting the text off the document, this view leaves the author's original writing traces intact, but allows the user to read the editor's ultra-diplomatic transcription through the *zoom* view's magnifying glass. Or, for editions where the act of translation has become an intricate part of the work's writing process (as in the case of Beckett's late short prose text *Stirrings Still* / *Soubresauts*, for instance), additional *language* options may be made available – such as the *bilingual comparison* tool that highlights translation variants between English and French versions of individual sentences. In the old version of the BDMP's interface, these different views and tools were all present at all times in the edition's (sub)menu structure – even if it was impossible to use them on the document in question. By removing these tools from the default navigational menu and only conjuring them in those cases where they can actually be used, the BDMP's new modular menu structure helped remove a lot of nav-bar clutter, allowing for a more intuitive and less confusing interaction with the edition's data.

¹² See: www.beckettarchive.org/search.

can do even more: through a list of suggested searches, she can guide the user to those passages in the documents that are especially relevant to her interpretation of the edition's materials. As a genetic edition, the BDMP wants to direct its users to the edition's genetic features – which is exactly what the *suggested searches* area will focus on. There, the user can request lists of all the doodles, intertextual passages, transpositions, dates, metamarks, and textual lacunae in any or all of the edition's modules. This can be a subtle but persuasive way to help the user get a better grasp on the complexity of the edition's data.

This method of filtering the data in such a way that it helps the user find what she is looking for has been especially useful for one of the BDMP's more recent editions called *Samuel Beckett's Personal Library*. This edition adds a more explicitly exogenetic¹³ dimension to the BDMP by linking the geneses of Beckett's individual works to the sources he consulted while he was writing them. Projects like this which attempt to digitise a canonical author's personal library for exogenetic purposes are often met with two basic, intuitive criticisms. Experience tells us that the reading behaviour that is implied by someone's personal library is often too inclusive (we have not always read all the books we own), while, at the same time, it may not be exhaustive enough (we do not always own all the books we have read). In its *Library* module, the BDMP aims to address both these problems.

The first problem, which argues that personal libraries can be too inclusive, is addressed in the module's *extant library*. This part of the edition combines (1) scans of the books in Beckett's personal library, located in Paris; (2) scans of the books that were donated to the collection of the Beckett International Foundation at the University of Reading shortly before Beckett's death; and (3) whenever possible, scans of books that were donated to third parties during Beckett's lifetime. Here, the BDMP tries to focus on those books Beckett actually read by dedicating special attention to the reading traces that can be found in Beckett's books. In 2006, the directors of the BDMP were granted access to Beckett's personal library in Paris, to make scans of the covers of all the books in the library, as well as of all the pages that contained reading traces. This limitation of the scanned materials was partly a pragmatic choice (scanning all of the pages of over 700 books in the library within the limited timeframe would prove impossible), but also a methodological one, as the marginalia and other reading traces constitute the only substantial type of evidence we have of Beckett's interaction with his source materials.

The second problem, arguing that personal libraries are usually not exhaustive enough, is addressed in the module's *virtual library*, which aims to reconstruct a list of books Beckett is likely to have read, but which no longer feature in his personal library.

¹³ "Exogenetics designates any writing process devoted to research, selection, and incorporation, focused on information stemming from a source exterior to the writing" (de Biasi 43–44).

Here, of course, the difficulty lies in determining which books – and, more specifically, which editions of these books – Beckett may have had access to. Nevertheless, a lot of research has already been conducted in this respect, which can help us compile a list of possible candidates. For her Ph.D. dissertation, my former colleague Veronica Bălă did just that, drawing up a hypothetical list of books Beckett is likely to have read while he was a student at Trinity College Dublin, on the basis of earlier research, an authoritative biography, Beckett's letters, reading notes, and the original TCD college calendars with Beckett's required reading lists (Bălă). With an additional 250 books, this virtual student library can function as an important resource for further exogenetic research on Beckett's works.

Adding up to a total of over a thousand books, many of which include a variety of marginalia and other reading traces, browsing *Samuel Beckett's Personal Library* can be quite daunting. That is why it is especially important to offer the user some guidance in her quest for a specific (type of) book in the module. Is she looking for any book, or only for extant ones? And in which period in Beckett's lifetime is she particularly interested? To this end, the module's navigation can already offer some solace. There, she can move from the complete library to its subsection with Beckett's *student library* – and as more research is conducted in this respect, more of these subsections could arise. Once in the *student library*, the user has the possibility to further specify the parameters of her search, by toggling the *virtual library* section on or off. Since the editors of the BDMP suspect that the edition's users will mostly use the *Library* to look for passages in Beckett's books that contain reading traces of some sort, the module's navigation also offers some material-based subsections, rather than period-based subsections. By clicking on *reading traces*, for instance, the user can narrow the list down to the 114 books in the library that contain reading traces – excluding virtual books and books of which only scans of the cover are available to the BDMP. Or the list can be narrowed down even further to only display only those 90 books in the *Library* that contain *marginalia* – the books in which Beckett has actually written something (excluding those books that only contain material reading traces, like tears or dog ears). A similar approach has also been adapted for the module's search engine. Starting from the supposition that the user will be looking *either* for a specific book *or* for a reading trace inside a book, a drop-down menu has been installed next to the search bar that allows the user to narrow down her query and search for a string in the module's bibliography, reading traces, or marginalia. After selecting a book, the user can use a similar tool to search for a string inside that book *alone*. These are all options that help the user filter the results of her query, letting the editor guide her towards those aspects of the edition she might be looking for.

But the editor's guidance can be even more useful when the *Library* starts to interact with the BDMP's other modules. A good example of how this may work is when

Beckett uses a quote from one of the books in his library (Kant's complete works) in his drafts of *L'Innommable*. In their monograph *Samuel Beckett's Library*, Van Hulle and Nixon refer to a letter Beckett wrote to Arland Usher to argue that he read the introduction of the last volume of this work in the first half of 1938 (137–138). In that introduction, it is explained that the anonymous motto of Kant's *Critique of Pure Reason* – “De nobis ipsis silemus” – was borrowed from a work by Francis Bacon (Kant 5). As the *Library* module shows, this citation is marked with a pencil mark in the margin in Beckett's personal copy of the work, suggesting that it caught his attention. As Van Hulle and Nixon suggest, this motto made quite an impression on Beckett, who often came back to it both in his writing and in his personal correspondences (138). So, too, while he was writing the first draft of *L'Innommable* where he copies the motto and the reference to the original (Bacon's *Novum Organon*) in the inside of the draft notebook's cover (MS-HRC-SB-3-10, insidebackcover). Afterwards, Beckett uses the quote in the novel's text itself (MS-HRC-SB-3-10, 44v), and keeps it there in all of the work's subsequent versions, including the author's translation of the work into English. Having found this direct link between Beckett's source materials and his drafts, Dirk Van Hulle decided to link these documents together by providing hyperlinks in the editorial notes that accompany their transcription. As such, the user may follow the editor's macrogenetic hypothesis by means of a hypertextual path in the edition.

I think this comes close to what Dahlström was talking about when he called for editors to leave Ariadne's threads in their editions to guide their users through the materials they have to offer. These threads become the traces of the editor's interpretation of those source materials that the user can choose to follow from one document to the next. Of course, these explicit links make the editor very *visible* again – and Virgil's voice becomes about as loud as it gets. But I would argue that the editor's distinct presence is not necessarily a problem here, because at this point (and especially when she is going through Beckett's personal library to look for marginalia) the user is already engaging with the materials on a high level. Thus, the editor's increased presence and guidance will only help to draw her even further in and encourage her to engage not only with the documents, but also with the links between them: links that, in this case, are based on the editor's interpretation as a genetic critic and that can then be assessed by the critical user in a very direct way, by interacting with the data through the edition's interface.

6 Conclusion

As this introduction to the BDMP and its Graphical User Interface has demonstrated, there are many different ways of guiding the user through the edition, all with

different degrees of editorial presence and regulation. And it is exactly this guidance that constitutes one of the core tasks of the scholarly editor. In her recent publication *Maschinenlesbar–menschlesbar. Über die grundlegende Ausrichtung der Edition*, Inga Hanna Ralle argues that the editor's task is not only to acquire knowledge about and new insights into the materials in the edition, but also to *actively direct* the reader's developing understanding about those materials:¹⁴

Es lässt sich festhalten, dass der Editor nicht nur sein Fachwissen einsetzt, um neues Wissen und Erkenntnisse zu erarbeiten, sondern auch um die Aufmerksamkeit, das Leseverhalten und Verständnis des Lesenden aktiv zu leiten. Der Editor fungiert demnach als Wegweiser für den Leser, was explizit nicht als Bevormundung verstanden wird, sondern als Angebot und Vorarbeit. (Ralle 179)¹⁵

While this passage was quoted from a section that focussed on the print edition, it is easy to see how Ralle's argument may apply to scholarly editing in general, regardless of the medium in which the scholarship and edited text(s) are presented. And indeed, as Ralle concludes in the very last sentence of her paper, it is important to keep in mind that the presentation level plays the same, crucial role in all scholarly editions regardless of their medium and that it should, therefore, be taken into account from the outset of the editing project (156).¹⁶ In this case, the change to a different medium simply means that different methods and tactics need to be devised and employed to fulfil this fundamental task in the field of scholarly editing. Both in print and in the digital medium, this mostly comes down to a combination of layout (or design) and paratext. And in the digital paradigm, it is the GUI that has taken over this essential editorial function and that has, therefore, also become a place for the editor to make her case about the materials she wants to disseminate.

The temptation here is to shower the user with possibilities, to try to cater to her every need, and to make all these different options available to her at all times. Because how else is she going to discover and take advantage of all the tools and information you have put in your edition, right? Based on my experience working at the University of Antwerp's *Centre for Manuscript Genetics*, however, I would argue that this is a temptation that we, as editors, must try to resist. I have referred to Dana

¹⁴ In Ralle's terminology, it is the *editorial narrative* that actively directs the reader's understanding ("editorisches Narrativ"; Ralle 152); or, in terms that were used earlier on in this paper, that makes the argument about the materials the edition encompasses.

¹⁵ Translation by the author: "It can be said that the editor not only uses his or her expertise to develop new knowledge and insights, but also to actively guide the reader's attention, reading behaviour and understanding. The editor therefore acts as a guide for the reader, which is explicitly not understood as paternalism, but as an offer and preliminary work."

¹⁶ "Wichtig ist die Erkenntnis, dass die Präsentationsebene für Editionen aller Medien die gleiche relevante Rolle spielt und dass sie von Anfang an mitgedacht werden sollte" (Ralle 156).

Wheeler's user study in this regard to argue that redundancy in the GUI is more often a distraction than a help. In her paper on reader roles, Rasmussen makes a similar case when she argues that

[t]he urge to click can easily become too tempting to resist, if we are cognitively or perceptually stimulated with possibilities that seem more exciting than what we are presently focused on. Knowledge sites have a wealth of potentials that can risk disrupting our phenomenological preoccupation with them, thereby limiting the possibility of hermeneutical reflection. (Rasmussen 131)¹⁷

It is this overstimulation that I have tried to counteract by introducing the concept of the Virgilian editor. Always present behind the scenes of the interface, she knows exactly when to step out onto the stage to direct the user's attention to a specific feature in the edition, and to explicate her interpretation of the materials the user is studying. This is, of course, no mean feat, and the editor's success in this regard should ideally be constantly re-evaluated by interacting with actual users. But therein lies the art of editing: in not just blindly copying culturally significant documents, but consciously determining how best to present those materials to the reader as well. In the end, digital scholarly editions should not just be machine-readable – if that were the case, we would indeed only need to provide a dataset, and possibly develop an API for accessing and reusing those data. Instead, the edition needs to be human-readable too: to convince a human readership of the cultural significance of those documents; to develop the reader's understanding of those documents by conveying her interpretation of their peculiarities; and hopefully to encourage the reader to be critical of that interpretation and to arrive at her own explanations. Achieving this in the digital medium means designing a GUI around our edited data with at least as much care and guidance as we did with the printed book.

¹⁷ Rasmussen borrowed this concept of the *urge to click* from Anne Mangen's *Hypertext Fiction Reading: Haptics and Immersion* (2008).

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¹⁸ This paper refers to a number of talks that were delivered at the *Digital Scholarly Editions as Interfaces* that took place at the Karl-Franzens University in Graz on 23–24 September 2016 (see: Andrews and van Zundert; Hadden; Porter; and Robinson). The abstracts for these talks can be consulted online via the following link: static.uni-graz.at/fileadmin/gewi-zentren/Informationsmodellierung/PDF/dse-interfaces_BoA21092016.pdf.

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Bridging the Gap: Exploring Interaction Metaphors to Facilitate Alternative Reading Modalities in Digital Scholarly Editions

Shane A. McGarry

Abstract

The Digital Scholarly Edition sits at an intriguing cross-section within the academic landscape. While its analogue counterpart, the Scholarly Edition, is primarily written for a fairly specialised audience, the Digital Scholarly Edition is, by the nature of its distribution model, open to the general public. For the first time in the history of Scholarly Editing, these editions – once of interest to a fairly small subset of academics – are now available to everyone, both within and outside of traditional academia, as the internet provides them with a free (or in some cases, low cost) access model. While the Digital Scholarly Edition has adopted many metaphors from the traditional analogue Scholarly Edition (such as the footnote, index, and table of contents), these metaphors are often implemented in a literal fashion without concern for how they can evolve in a digital space. Drawing on the work of noted experts in the field of Interaction Design and Information Architecture, these interactions, along with additional interaction techniques, will be discussed in an effort to support new, digital modes of reading. A blended approach of the traditional interaction metaphors with newer metaphors will be advocated in order to support the forward momentum of the Digital Scholarly Edition and digital scholarship as a whole.

1 Introduction

Scholarly editions have long provided textual scholars with a mode of knowledge dissemination. However, the evolution of the edition into the digital landscape has created a new experience, allowing for interactions with the text which are far beyond what is capable in the physical medium. Unfortunately, the Digital Scholarly Edition still borrows heavily from its analogue counterpart with regard to the interface. The use of footnotes and endnotes, the inclusion of an index or table of contents, the notion of a *page turn*, and the function of a critical apparatus are all borrowed from the analogue book (or in the case of the critical apparatus, the scholarly edition as a book). Each of these components – which, when transferred to the digital, become known as functional metaphors – serves to facilitate the ultimate goal of the traditional

edition: reading. And while the Digital Scholarly Edition provides ample support for traditional close reading, research has shown that readers do not read the same digitally as they do when reading print (Liu 701; Burbules 102).

While it is true that some of these metaphors have been adapted to support alternative methods for navigating the Digital Scholarly Edition, many of the common metaphors borrowed from the book serve primarily to facilitate close reading. However, it is clear that most of these common metaphors do not provide support for alternative methods of textual engagement. As the digital medium removes the physical barriers associated with the book, scholars and the general public alike are provided with an environment which not only facilitates alternative methods of engagement, but actively encourages them. This can be seen most readily when examining various alternative methods of reading – such as *hyperreading*, *radial reading*, and *distant reading* – and understanding the interactions which support them. Through a careful examination of these modalities and how existing metaphors can be adapted or new metaphors can be created, Digital Scholarly Editions can transcend the artificial boundaries of their print counterparts and embrace an environment which supports not only its original intention – that of close reading – but also alternative reading modalities which actively engage with the medium, thus leading to an experience beyond the traditional scholarly work.

2 Problems with digital reading

Reading is defined as “the process of constructing meaning from written texts. It is a complex skill requiring the coordination of a number of interrelated sources of information” (qtd. in Anderson et al. 389). In an academic context, this process is taken a step further through *close reading*. Close reading, defined as “[the] instructional practice that makes complex texts accessible using repeated reading, cognitive scaffolding, and discussion” (Fisher and Frey 35), has been the traditional method of critically examining a text and continues to be a strong focus with regard to literacy and reading education. The U.S. Common Core standards specifically state the importance of close reading, noting:

Students who meet the Standards readily undertake the close, attentive reading that is at the heart of understanding and enjoying complex works of literature. They habitually perform the critical reading necessary to pick carefully through the staggering amount of information available today. (CCSSI 3)

The skills associated with close reading – such as meticulous analysis of language patterns, pattern combination, and analysis of irony, symbolism, and metaphor – are

seen as necessary to truly understand and comprehend the text in question (Hinchman and Moore 443).

Although traditionally, close reading techniques are generally applied to literary analysis, this type of close, attentive, sequential reading from beginning to end is a necessary part of the comprehension process of linear texts, whether it be in the form of a work of fiction, a poem, short story, periodical, letter from a loved one, etc. As an example, when reading a newspaper, a reader will often re-read given sections in order to facilitate the cognitive processes involved in parsing fact from opinion or to assist with her ability to construct an informed opinion on the subject matter. When reading a letter, a reader pays close attention to given sections, analysing the use of language, looking for the use of metaphors or symbolism, and interpreting the tone of the writing in order to tease out any subconscious clues related to the author's emotional state of being.

However, with the advent of digital technology and the plethora of information readily available via digital sources, close reading techniques are less likely to be used in digital environments (Hayles 56). Numerous studies have shown reliance upon traditional close reading techniques in digital environments lessens reading comprehension (Mangen et al. 65–67), a phenomenon which is not prevalent with printed materials (Jabr, par. 6). A study conducted by Mangen, Walgermo, and Brønnick in 2013 highlights many of the issues inherent with the application of close reading techniques in digital environments. In this study, Mangen and her team evaluated the rate of reading comprehension between two groups of readers, each reading two versions of the same text: one in an analogue (print) format and another in a digital (PDF) format. The text itself contained both a narrative text as well as an expository text. Her study demonstrated that those who read the analogue form of the text had a greater comprehension rate than the readers of the digital version of the text.

Mangen et al.'s study proposed two primary contributing factors: metacognition and navigability of the text. Metacognition, defined as “[k]nowledge and beliefs about one’s own cognitive processes” (Colman, par. 1), has been shown to have a strong influence on a reader’s ability to process text, due largely in part to inherent biases the reader possesses regarding digital versus analogue text (Ackerman and Goldsmith 28–29). According to Ackerman and Goldsmith, readers have an innate bias towards digital reading, viewing it as *easier* and *less effortful* than analogue reading; as a result, this bias creates a meta-metacognitive process (also known as a second-order level judgement), leading the reader to subconsciously allocate less attention to a digital rendition of a text (Ackerman and Goldsmith 29–30).

The use of navigation within the text highlighted by Mangen et al. is perhaps the more relevant issue, as it can be addressed through an application of solid design principles. They noted that one of the primary navigation issues was that of the

reader needing to *scroll* through the text, as the entire body of the text did not fit on screen, creating a type of “spatial instability” (65). Piolat et al. note the importance of positional placement when reading text. In their experiments using eye-tracking software, Piolat et al. noted how the gaze of the eye was forced to constantly reposition itself when reading in digital environments (565–566). Unlike in a print environment, where the eye remains relatively stable as it is only tracking a page at a time, the scroll effect in digital environments forces the eye to continually reposition in order to track changes within the environment. This spatial instability leads to a decrease in the reader’s ability to comprehend the text (Piolat et al. 566; Mangen et al. 65).

Spatial instability is not the only navigation-related problem in digital environments. Various studies have shown that readers rely upon the position of text within a physical space to aid in recall, particularly when attempting to recall specific information (Giulia Cataldo and Oakhill 797; Piolat et al. 566; Zechmeister and McKillip 451). By its very nature, printed text offers rigid, physical structure which allows the reader to construct a mental map of the text, regardless of the length of the text in question. This map is often referred to by the reader in order to recall relevant bits of information (McKnight et al. 72–73; O’Hara et al.), such as recalling the position of a passage being located on the lower left-hand side or the upper right-corner of the page. This recall assistance provides an easier path to cognition for the reader by providing her with an additional mode of categorisation: that of physical placement (Jabr, sec. “Navigating Textual Landscapes”, par. 3). However, in a digital environment, this rigid, physical structure is removed. Consider, for example, the earlier spatial instability problem where the text has no true, permanent place on screen but rather a fluid, virtual place. Mangen et al. note that without this physical boundary, the reader has lost a vital cue to aid in the recall process (65–66). Due to digital reading’s immersive and often multi-faceted nature, the cognitive functions of the brain engage with reading in ways different from that in print (Mangen 405).

These problems are inherent primarily when approaching the text utilising a traditional, close reading. However, as Hayles notes, the decline in close reading techniques, coupled with the problems intrinsic to close reading in digital environments has led to an evolution in how we engage with textual content in digital environments (Hayles 56–91). From this evolution, alternative modalities of reading have developed. For the purpose of this paper, three modalities will be discussed: hyperreading, radial reading, and distant reading.

3 Alternative reading modalities

Hyperreading, the most common of the three, is perhaps best defined as reading which takes place specifically with regard to hypertext and occurs in a non-linear

fashion (Zhang 24). While print media can be read in a non-linear fashion (via the use of tools such as the index or table of contents), for clarification purposes, the definition of hyperreading here specifically refers to non-linear readings of digital text. Despite the fact that hypertext can be read in a traditional manner, following a linear structure (like that of printed text), the nature of hypertext allows the reader to carve her own path through the narrative. Unlike hyperreading, traditional print reading within scholarly editions is hierarchical by nature. While print reading can be approached in a non-linear fashion (by jumping to end notes or the index, for example), the form of the book makes this cumbersome. Hypertext, by contrast, can be linear as well as lateral due to the lack of boundaries imposed by a physical medium, therefore breaking the metaphor of the linear, structured text and organisation of ideas. Hypertext, then, has the capacity to create nuanced and complex relationships between narratives (Burbules 107). Zhang notes that while traditional reading leads to the development of hierarchical thinking skills – due to the highly structured nature of a printed work – hyperreading promotes a kind of “thinking by association” (24).

This thinking by association can then lead to further cognitive development. Uso-Juan and Ruiz-Madrid note the importance hyperreading plays in the development of a user’s reading skills due to its reliance on a greater cognitive effort by the reader as a result of the multiple paths to content afforded by the environment (62). Such skills lend themselves to an increased flexibility in a reader’s ability to understand and consolidate information from a variety of sources. As Loretta Kasper notes:

Reading hypertext is a naturally dynamic, recursive, and integrated process, one that provides multiple opportunities for students to acquire, test and reframe knowledge through cognitive reconstruction of text, intertextual analysis and exposure to varied perspectives on issues. Thus, hypertext may promote increased comprehension through the elaboration and integration of new information into the existing knowledge network as readers create and expand the cognitive map that guides their construction of meaning. (Kasper, sec. “Hypertext and Reading Skills”)

However, it should be noted that hyperreading is not without its disadvantages (Uso-Juan and Ruiz-Madrid 63). Some of these disadvantages (such as a lack of clear navigational or contextual clues to and from various content nodes, or device-specific issues such as screen resolution, glare, or eye strain) can be addressed via solid information architecture practices or via more suitable hardware designs, which continue to evolve along with the requisite technology. The most glaring problem, however, lies within the notion of “cognitive overload”, as highlighted by Kasper.

Cognitive overload occurs when working memory, defined as “the set of mental processes holding limited information in a temporarily accessible state in service of cognition” (Jaeggi et al. 75), is provided with an influx of information beyond

its capacity to process. The phenomenon is a common, recurring problem with digital reading. While it is often presented as a problem specifically with regard to hyperreading, studies have shown it to be problematic with how we consume standard text in digital formats as well (Horava 83). Some of the factors which contribute to cognitive overload – such as the meta-metacognitive response to digital reading versus print or the lack of a physical boundary to assist with recall, both of which were highlighted above – cannot be easily addressed. Others, such as spatial instability or textual layout, however, can be addressed via the implementation of design principles. Thus, it becomes an issue of usability design to ensure non-linear content is presented in such a way so as not to cause a *rabbit hole* scenario in which the reader becomes lost in a virtual quagmire of content due to this type of information overload. Burbules also notes that while digital environments have conditioned us to screen information more efficiently, as a consequence we have also seen a reduction in our ability to sustain attention for any length of time (108). This, in turn, makes traditional close reading techniques more difficult in digital environments, a problem which is not as prevalent in traditional print environments (Jabr, par. 6).

Hyperreading is but one of the alternative modalities available to the reader. Jerome McGann has long been a proponent of looking at text differently in digital environments. In his book *Radiant Textuality*, McGann notes the limitations of text in the physical book and recognises the possibilities offered by digital tools and their environments, stating:

When we use books to study books or hard copy texts to analyze other hard copy texts, the scale of the tools seriously limits the possible results [...] electronic tools in literary studies don't simply provide a new point of view on the materials, they lift one's general level of attention to a higher order. (McGann, *Radiant Textuality* 55)

He goes on to note that scholarly editions are notoriously difficult to read because they employ a book form to study another book form. In McGann's words, "[t]his symmetry between the tool and its subject forces the scholar to invent analytic mechanisms that must be displayed and engaged at the primary reading level" (*Radiant Textuality* 56). Digitisation removes the physical barriers by moving the content into a virtual environment, no longer dependent upon the physical medium, allowing "semantic and visual features" to be "simultaneously present" (McGann, *Radiant Textuality* 57).

This digitisation of text thus supports McGann's concept of "radial reading", which he first proposed in 1991. Radial reading involves reading *outward* from the text by expanding the content of the text with external sources (McGann, *The Textual Condition* 120). Radial reading is inherent in traditional scholarly editions by encouraging the reader to refer to the notes (both footnotes and endnotes) and via the use of the index. However, this type of reading in a physical environment can be cumbersome,

Wednesday, 5th January, 1916

No news this morning.

Aunt Maisie lent us the small motor in the afternoon so we went to see

Aunt Helena she was very grieved to hear that we had no news of **you**

& is praying hard & getting prayers said for **you**. We spent quite a long time

& then **Ethel** & I went on to the **College Convent** at **Donnybrook** to get prayers

there. We had a most amusing experience as the gate happened to

open & the car drove in. So **Ethel** & I ventured in where a door was open

& light shining but we saw we could get no further & and heard a very low

mysterious voice coming from we knew not where & but we could not

make ourselves understood & ran away. We called at the lodge & saw two women

there who were fearfully excited & told us to take the car away at once it

should never have gone in. & that we would not have found the gate open

only they were expecting a hearse. However we said we would write our business

Charles Andrew Martin

Born 3 June 1895, Charles Andrew was Mary Martin's son. This diary is dedicated to him. He was reported wounded and missing in December 1915 and died of his wounds on December 8 while in Bulgarian captivity, aged 20. However it wasn't until July 1 1916 that official confirmation of his death was received.

Figure 1: Modal popups in *The Diary of Mary Martin*. Reproduced with permission from the project team.

as it can disrupt the natural flow of the reader, as she must interrupt the reading process to turn pages in order to locate additional information elsewhere within the text. This utilisation harkens back to McGann's earlier quote above, which specifically addresses the notion of using a book form to study a book form. However, in a digital environment, with the physical constraints of the book removed, radial reading can be easily supported by placing the apparatus and its subsequent components at the fingertips of the reader, allowing these external sources to flow alongside (or even within) the body of the text. This can be accomplished in numerous ways, perhaps the most common being that of the modal popup as seen in *A Family at War: The Diary of Mary Martin* (see figure 1).

Franco Moretti offers a more revolutionary approach to reading. Whereas Hayles and McGann largely concern themselves with reading environments for a small corpus or edition, Moretti seeks to answer the question originally proposed by Gregory Crane: "How do you read a million books?" (Crane). He points out what he perceives to be the inherent flaw with close reading which is that, by design, it depends upon an extremely small corpus (Moretti 48). In his work with world literature, Moretti felt

it important to migrate away from the notion of a small canon to truly understand a particular genre, stating “[close reading is] a theological exercise – very solemn treatment of very few texts taken very seriously – whereas what we really need is a little pact with the devil: we know how to read texts, now let’s learn how not to read them” (48).

From this idea, Moretti developed his notion of distant reading, defined as the ability to “focus on units that are much smaller or much larger than the text: devices, themes, tropes – or genres and systems” (48–49). Through the use of tools such as topic modelling, network analysis, and data visualisations, distant reading techniques can provide the reader with a *30,000-foot view* of the corpus in question, allowing readers to note patterns that may not be visible utilising only a close study. Distant reading provides Digital Scholarly Editions with a unique method of investigation.

While Moretti originally proposed the idea with a large corpus in mind, distant reading techniques can easily be applied to a smaller corpus and still provide the reader with valuable insight. For example, *The Letters of 1916*, a corpus of roughly 1,400 letters at the time of this writing, would not be considered a particularly large corpus by Moretti’s standards. It would be feasible to read through all 1,400 letters and conduct a close reading of each. However, distant reading techniques – such as a network analysis of the senders and recipients, or data visualisations which allow the reader to investigate the corpus by topic or gender – provide a pictographic, high-level view of the data, which can be easier to process, cognitively speaking (Drucker 65). These types of visualisation techniques allow us to “break the literalism of representational strategies and engage with innovations in interpretative and inferential modes that augment human cognition” (Drucker 71). However, it is important to note that while the tools and insights offered by distant reading are unique – and, by some standards, revolutionary – it is not meant to replace close reading, but rather to augment it.

4 The role of the interface

Understanding the ways in which readers engage with text in a digital environment via alternative modalities of reading is only the first step. The role of the interface also plays a vital part in engaging the reader. Not only does the interface play a role in how well the user can locate information within a system, but one of the cornerstones of Human Computer Interaction is the notion of *retention* – how long over a period of time the user is able to retain and recall information derived from an electronic source – which is strongly influenced by how much time the reader spends obtaining the information and how frequently the digital system is utilised (Shneiderman et al. 14). Johnson notes the importance of consistency in the user interface with regard to enhancing long-term memory retention (Johnson 92–95). In

order to illustrate this, Johnson cites the example of the copy-and-paste functionality within word processing software (Johnson 94–95). Word processing software can support various types of content: text, images, embedded video, tables, pre-defined shapes, and so on. In the first design scenario, all of these content types support copy-and-paste functions via the same keystroke (for the purposes of this example, Ctrl+c and Ctrl+v). In the second design scenario, each content type has its own copy and paste keystroke (text will use Ctrl+c and Ctrl+v; images will use Ctrl+k and Ctrl+l; video will use Ctrl+r and Ctrl+t; etc.). In the final design scenario, all content types will utilise the same keystrokes for copy and paste *except* videos which will use a different keystroke (for example all but video use Ctrl+c and Ctrl+v but video uses Ctrl+y and Ctrl+t). Using this example, it is easily understood that the first design scenario is the easiest to learn and recall because all modalities of content leverage the same, consistent keystroke pattern to perform the same function. In the other two design scenarios, a more significant burden is placed on the user's cognitive abilities, thus making the system more difficult to learn and recall (Johnson 95).

Wiedenbeck also notes the role of the interface with regard to learning and retention. In her article, Wiedenbeck examined the use of icons and labels to denote system functionality. She had users with little to no experience of a system attempt to use that system in three different scenarios: one scenario where functions were depicted by only icons; one scenario where functions were depicted by only labels; and a third scenario where functions were depicted by both an icon and label. Her findings showed that users in the first scenario had more difficulty than those in the second and third scenarios. She theorises this is due to the fact that in the second and third scenarios the users need only interpret the functionality the language points to, as they intuitively understand the natural language of the labels; whereas in the first scenario, the user must first interpret the symbol – translating to natural language – and *then* interpret the functionality within the system to which the icon refers. This dual interpretation leads to an increase in cognitive load which by default causes retention to become more cumbersome (Wiedenbeck 79–80).

Proper categorisation within the interface can also aid in the brain's ability to retain and recall information (Johnson 139–141). Consider the organisation of the standard webpage, which has evolved over the past 20 or so years. The commonly accepted format for any website is for the logo to appear in the upper left (which is hyperlinked to always return to the home page); the navigation to appear either along the top of the page as a pull-down menu, along the left-hand side of the page as a list, or hidden behind a "hamburger menu" which causes either a left-hand or right-hand slide-out to appear with the menu options; and content in the centre of the page. This consistent layout implementation is done in a hierarchical and categorical method in order to facilitate retention. If a user needs to locate a navigation item or quickly return to the homepage, she knows immediately where to access these

items on the page, regardless of how deep she may be within the website itself. If this categorisation did not exist and these elements did not appear consistently or were scattered across the location of the page, the user would have a significantly more difficult time locating the information for which she is searching.

The study of this type of categorisation is a primary function of the field of Information Architecture, known as “the art and science of shaping information products and experiences to support usability, findability, and understanding” (Rosenfeld et al. 23). Information Architecture provides a framework for which designers can reduce the cognitive load of the user. It is concerned with more than just the names of control labels or the icons used within a given system. It extends the study far beyond, considering the greater eco-system as a whole (Morville, loc. 244–256 of 2808). The previously mentioned categorisation is essential, then, because it considers not just the placement of the logo or the labels used within the navigation scheme but rather how each of these components work together to form a holistic approach which enhances usability and decreases the cognitive load which can inhibit memory and retention.

Johanna Drucker also notes the importance the interface plays with regard to cognition, specifically distributed cognition which is defined as the idea that both sensory and motor activities contribute to one’s ability to gain knowledge or experience (140). In her book *Graphesis*, Drucker discusses the early importance of sensory input in order for humans to effectively utilise computers. Pioneers such as Douglas Engelbart (who created a prototype for the first mouse device) and Ivan Sutherland (who created one of the first head-mounted displays in an early attempt at virtual reality) recognised the importance the interface plays in engaging the user (Drucker 140–141). Whether through the use of external peripheral or through effective usability design (such as Shneiderman et al.’s direct manipulation style of interaction), immersion plays an important role regarding the user experience. By increasing the sense of immersion, digital environments can greatly increase a reader’s ability to comprehend the text (Dede 66). This immersive nature of the interface can be seen throughout the evolution of personal computing. In the early years, immersion was brought to the forefront via the use of additional peripheral, such as the keyboard or mouse. In more recent years, immersion has been addressed via design techniques which seek to draw the attention of the reader and engage her on a more than intellectual level.¹

The interface also acts as a gateway to the information contained within the Digital Scholarly Edition, not only due to the importance of how the information is organised

¹ Shneiderman et al. discuss the use of direct manipulation techniques to increase the level of immersion. This is primarily done by implementing affordances which provide immediate feedback to the user, giving the illusion of control (Shneiderman et al. 67–68, 199–204). This can be seen in many modern interfaces through the use of slider controls (which may control video playback, the zoom level for an image, or sound volume) or the “drag and drop” feature common within many file-based systems.

but also through the emotional interplay which can be evoked by the interface itself. If the interface is unfriendly or provokes a negative emotional response, the user will navigate away from the material. As Shih and Liu note, “[u]sers are no longer satisfied with efficiency and effectiveness; they are also looking for emotional satisfaction” (203). Unlike printed material, which largely conforms to a universal set of rules and has interactions and affordances bound by the physicality of the medium, the Digital Scholarly Edition does not possess such uniformity, providing each edition with the opportunity to produce a unique experience. While this uniqueness can set the edition apart within the mind of the reader, it can also create unnecessary barriers to information if the interface is not properly considered. Items such as interactivity, immersion, information architecture, and even the use of colour can have a strong impact upon the reader’s experience within the edition.

While many of the former items (interactivity, immersion, and information architecture) are given priority of place in design discussions, too often the use of colour is not considered from a psychological standpoint. Colour has a major impact in how the reader processes and receives information: “[a] person’s response to color and tone can help determine how information is understood and can affect whether a consumer buys a product or uses a client’s services” (Aaris 78). Despite the more private sector focus of Aaris’s quote, her assertion holds true even in scholarly works, as colour can affect the reader’s emotional response to the text, thus biasing her consumption of particular information or even causing her to navigate away from the edition (Aaris 79–82). Colour theory is still in its infancy with regard to how it affects readers and their respective experiences with digital content, but there is enough data to highlight it as an item of relevance.

The emotional interplay brought about by the use of colour, coupled with the way in which a reader interacts with the edition based on her user experience and emotional response serve an obviously vital role in the *success* of the edition. It is through this careful balance of utility and functionality coupled with the aesthetic lure that leads to an increased emotional response that can transform an edition from digital text to a digital *experience* (Hartson and Pyla 29). Norman discusses this balance,² noting the importance it plays regarding decision making and behaviour: “One of the ways by which emotions work is through neurochemicals that bathe particular brain centers and modify perception, decision making, and behavior. These neurochemicals change the parameters of thought” (*Emotional Design* 10). Aspects such as colour (which

² Norman (*Emotional Design*) breaks down the emotional response into three primary components: the visceral (which deals primarily with the response to an aesthetic), the behavioural (which is found primarily in the response to the functional aspects of a system) and the reflective (concerned with the *after-effect* of a system whereby the user reflects upon her interaction with the system after use and makes decisions regarding its usefulness or effectiveness) (Norman, *The Design of Everyday Things* 5, 37–38).

elicits a visceral response) or systems which support information-seeking³ (which tends to have a reflective response) are just as important as the more functional (or behavioural) aspects of the interface.

Finally, Ruecker et al. note the other important role the interface plays with regard to engagement: that of a marketing tool or attraction method. With the ubiquitous nature of digital content, Digital Scholarly Editions compete for a *mindshare* of the individual's resources. As most of this digital content is designed to be attractive and memorable, it is only logical that the interface for a Digital Scholarly Edition must also be designed in such a way as to compete for this mindshare and separate itself from the plethora of online materials available on a given subject (Ruecker et al. 172). The Digital Scholarly Edition is more widely available to the average reader than its analogue counterpart, thus the notion of *attraction* – the ability of the edition to *stand out* and mark its place in the reader's mindshare – is an essential component to be considered.

5 Examples of alternative interactions

By understanding the ways in which readers can engage with digital text via alternative reading modalities, as well as the role the interface plays in the support of digital interaction, new interaction paradigms can be explored and discovered. Some of the *stock* interactions commonly used by Digital Scholarly Editions can be reworked to support alternative approaches to close reading. For example, footnotes and endnotes can be implemented in a literal fashion with the existence of the note at the bottom of the virtual *page* as seen in *The Letters of Matthew Arnold* (see figure 2); however, they can also be implemented as modal overlays as seen in *The Woodman Diary* (see figure 3), an interaction impossible to achieve with an analogue book but quite native and familiar in a digital environment. In both examples, a close reading experience is possible and is enhanced by the inclusion of additional material. However, in the latter example, hyperreading is also supported through the introduction of the modal overlay, primarily through the use of the *View in Glossary* function (which can be seen in figure 3). This function redirects the user to a page with further information about the particular item being described (see figure 4). If available, this *glossary view* will also detail other entries within the diary which mention the term in question. This facilitates a more *non-linear* reading of the source material. In addition, external resources are often supplied in the *glossary view*, thus allowing for further readings

³ Information-seeking (Carenini 383) plays a vital role in what Attrill defines as a *need for cognition*, which she defines as “desire to both employ cognitive effort and to enjoy the rewards of that effort” (39). This need plays a significant role in how users leverage systems. Norman's three types of emotional responses all seek to meet this need for cognition.

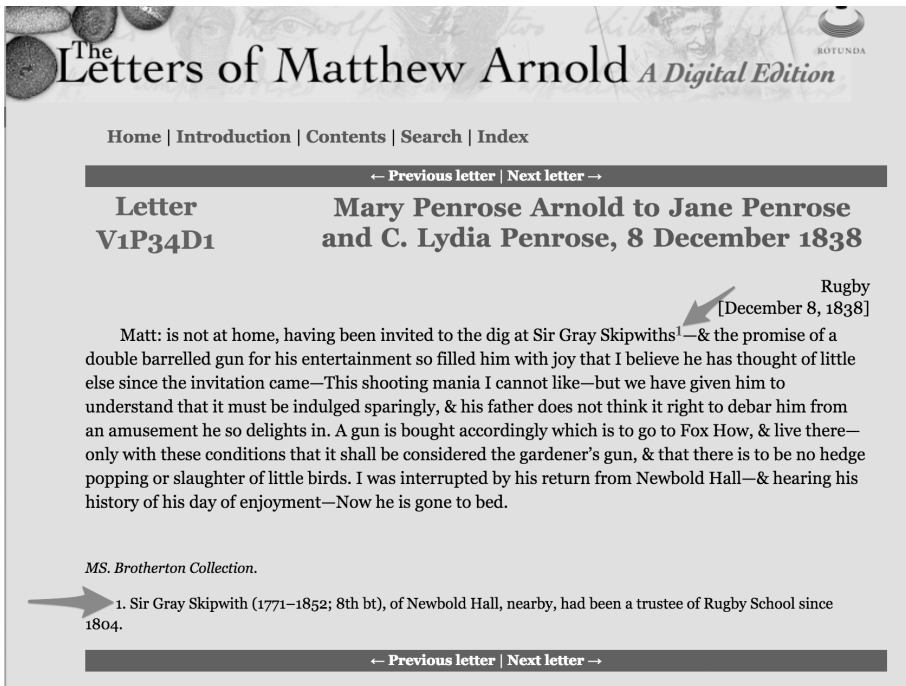


Figure 2: Footnotes in *The Letters of Matthew Arnold* (annotation added). Reproduced with permission of the University of Virginia Press.

outside the source text, which can provide for further engagement with the text and provides support for a radial reading approach.

One can also examine these same two examples from both a utilitarian and aesthetic viewpoint. *The Letters of Matthew Arnold* relies upon the Gestalt principle of similarity (Johnson 14–15). By grouping the footnotes at the end of the document and decreasing the point size of the font (see figure 2), it is clear to the reader that the footnotes play a different role than the standard body text. However, under the *Gestalt* principle of proximity, these footnotes are also de-emphasised and, thus, seen as “less important” to the user (Johnson 11–13; Schlatter and Levinson 37–38), a factor which may or may not be problematic depending upon the goals of the editor or the reader. However, in *The Woodman Diary*, these footnotes, which also rely on the principle of similarity by the use of coloured text (see figure 3), are not de-emphasised because their placement remains directly within the primary text, giving them equal *weight* of importance in the mind of the reader due to both the principle of proximity and the principle of

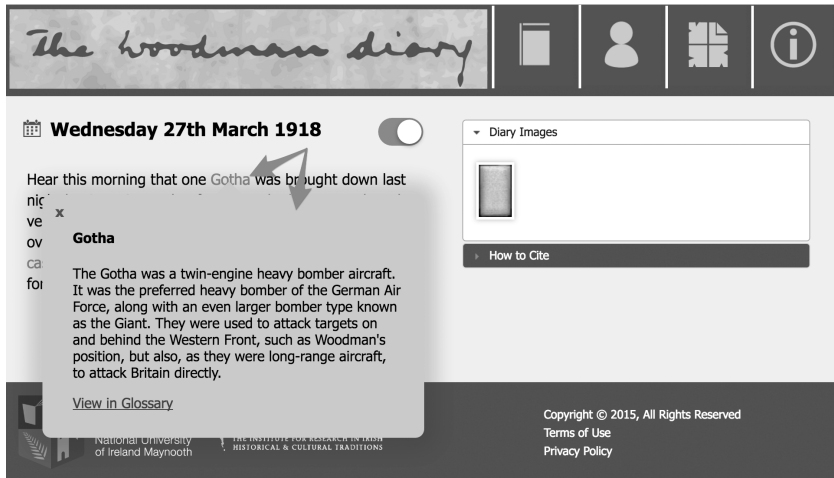


Figure 3: Footnotes in *The Woodman Diary* (annotation added). Reproduced with permission of An Foras Feasa.

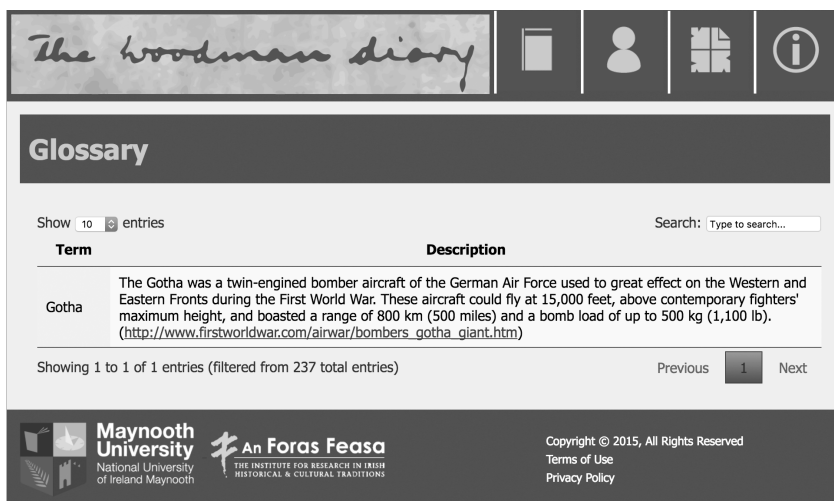


Figure 4: Use of the Glossary in *The Woodman Diary*. Reproduced with permission of An Foras Feasa.

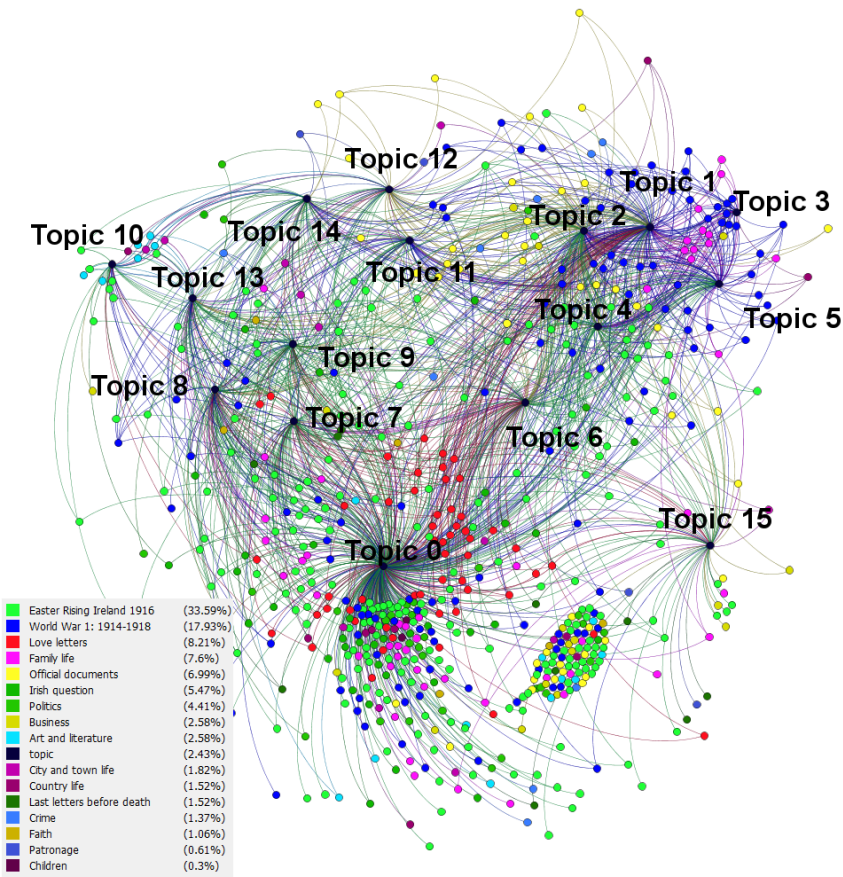


Figure 5: Visualisation in *The Letters of 1916* showing the distribution of letters into topics using LDA topic modelling and Gensim (Bleier, sec. Gensim – 16 topics). Reproduced by permission of An Foras Feasa.

figure/ground (Johnson 14–15). Additionally, the interface appears less *busy* as the text is hidden behind an overlay which could hold appeal to the user from an aesthetic standpoint as design patterns move more towards flatter, less crowded environments.

Distant reading provides the reader with perhaps the most unique opportunities from an interaction standpoint. Support for distant reading is seen in the use of data visualisations and topic models. For example, *The Letters of 1916* has begun to

develop static visualisations in order to facilitate a distant reading approach across the corpus of letters (see figure 5). These visualisations provide a valuable research tool for those interested in dissecting information across various categories, by gender of the author(s), or perhaps by location. While this same information could be obtained through a close reading of each letter in the corpus, this process would be time-consuming. By leveraging topic models and the requisite visualisations built atop them, a reader can begin to look for patterns to help narrow down interest or look for anomalies.

However, these static visualisations only take the reader so far. Without some level of interactivity, the reader cannot pick out a subset of material, thus providing for a deeper engagement with the corpus and, more importantly, acting as an enrichment to the close reading process. These pictographic representations of textual content provide readers with a much more intuitive mode of interaction with the text than traditional reading. Reading itself is not a natural process from a neurological standpoint. Unlike speaking and understanding language, which is a natural ability with dedicated neural pathways, reading is not a hard-wired activity in the brain; however, the ability of the brain to recognise patterns and shapes is a process which is entirely natural and supported by neural pathways forged over thousands of years of evolution (Johnson 33). Therefore, providing the reader with images and visualisations as a starting point is a logical extension of the process of reading within the brain. By providing the visualisation of data as a starting point for research, the brain can begin to immediately recognise patterns and look for clusters of information which may be of interest to the reader. Because images do not have a codified language and structure, they are also highly qualitative and subjective. As Drucker notes, “[u]nlike language, which has a grammar, or mathematics, which operates on explicit protocols, visual images are not governed by principles in which a finite set of components is combined in accordance with stable, fixed, and finite rules” (24). Through the use of data visualisations, the user is empowered to begin to make connections and draw conclusions which would not be otherwise apparent through a traditional close reading of the text.

6 Conclusion

The Digital Scholarly Edition is far from static, however, and continues to grow and evolve alongside technology. More editions are embracing hyper- and radial reading approaches, such as *Letters and Texts* at the Humboldt University (see figure 6) and *Borchward’s Journey* (see figure 7). Additionally, other editions have begun to incorporate visualisations as research and finding aides. For example, *The Diplomatic Correspondence of Thomas Bodley* uses a timeline graph as a method of “browsing” the

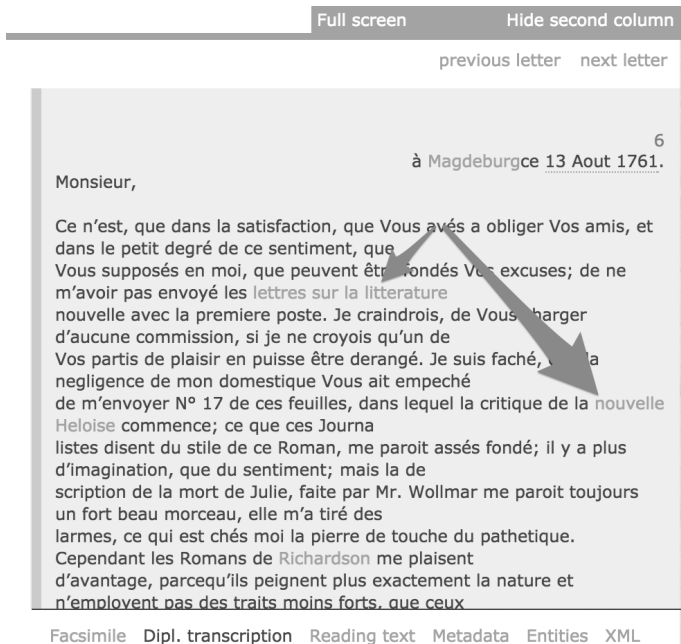


Figure 6: Hyperreading as seen in *Letters and Texts* (annotations added). Reproduced under Creative Commons Attribution 3.0.

collection by date (see figure 8). Rather than listing out years or months for the user to simply click on and see a list (as can be seen in various other editions), the timeline view allows the reader to visualise how Bodley's correspondence clusters within a given time period. The same information can be extrapolated from both methods; however, the use of the timeline is easier to understand due to its reliance on imagery.

While the examples provided above have made some progress in breaking away from analogue metaphors, these interactions must continue to be driven forward. Hyper- and radial reading require a distinct editorial decision on how the text is structured and linked. They move beyond simply presenting links, instead providing non-linear pathways through the text. These methods of alternative reading are relatively inexpensive to support from a technical standpoint but require significant editorial intervention in order to adequately link the content. These hyperlinks, which support hyper- and radial reading, can also be used to imply a *semic relationship* between texts or nodes of information, not only by implying relationships but also by controlling access to information in a sense, as readers may not be aware of certain

Vorerinnerung

#1 Da ich Potsdam schon öftters besucht, und die meisten Seltenheiten daselbst gesehen hatte; so richtete ich vor dißmahl meine Aufmerksamkeit nur auf dasjenige, was seit 4 Jahren von S[eine]r: jetzt regierenden Königl[ichen]: Majestät: daselbst an dem alten Schloß verändert, und in Sans Souci angeleget worden.²

#Abb_01

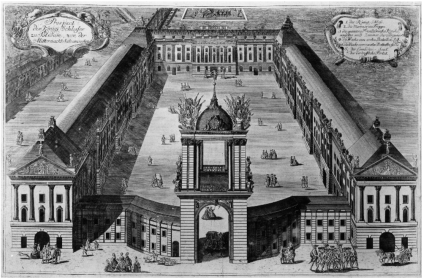


Abb. 01: Johann David Schleuen d. Ä.: »Prospect des Königl. Schlosses zu Potsdam, von der Mitternacht-Seite anzusehen«, um 1755, Kupferstich und Radierung, SPSCG, GK II (1) 7545. © SPSCG, DIZ / Fotothek

Gemeint sind das als »altes Schloß« bezeichnete Potsdamer Stadtschloß und Schloss Sanssouci. Das Stadtschloß wurde am 14. April 1945 durch Bombenabwürfe zerstört, 1959–1961 gesprengt und abgetragen. (J. W.) Die Entwicklung des Parkes Sanssouci begann mit der Anpflanzung des Weinberges am 4. April 1744, dem Befehl zur Anlage der Weinbergterrassen vom 10. August des Jahres und der Anordnung vom 13. Februar 1745 zum Bau des Schlosses Sanssouci nach den Ideen des Königs und Plänen von Georg Wenzeslaus von Knobelsdorff (Giersberg 1986, S. 55). (S. H.) Gleichzeitig mit dem Terrassenbau wurde 1744 auf Anordnung Friedrichs eine Gruft an der Ostseite der obersten Terrasse als letzte Ruhestätte des Königs angelegt (Manger 1789, Bd. 2, S. 504. – Giersberg / Krüger 1992). (C. D.)

Figure 7: Hyperreading as seen in *Borchward's Journey* (annotations added). Reproduced with permission of Perspectiva.

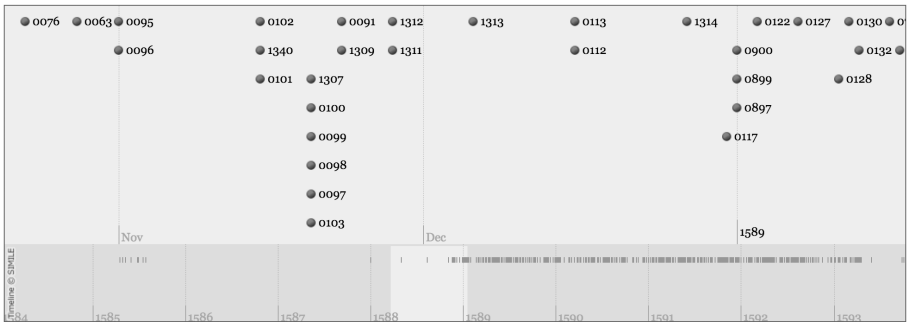


Figure 8: Use of visualisations (timeline graph) to facilitate search in *The Diplomatic Correspondence of Thomas Bodley*. Reproduced under Creative Commons Attribution 3.0.

information contained elsewhere within the corpus without the hyperlink which calls attention to it (Burbules 105). However, the use of these links can also become problematic as they do not necessarily provide a reciprocal relationship; that is, a hyperlink may exist from page A to page B, but the inverse may not be true. Here lies potential for a new interaction paradigm, which could assist both the editor and the reader with linking information and nodes within the content. Further research is needed.

Finally, it is through support for distant reading – specifically via the use of interactive visualisations – that the Digital Scholarly Edition will alter the landscape of digital textual scholarship. By allowing other scholars and researchers to explore the content via means which are inherently natural to the brain, these techniques provide the potential to unlock not only new realms of understanding and scholarship, but also awaken curiosity for humanities data across a broader spectrum of the populace. As Drucker notes, “[a]s a scholarly act, interpretation has almost always been textual, based on close reading, and intimately bound to the graphic form of the work to which it attaches. None of this is exclusively true any longer” (180). Embracing the importance of interface and the role it plays with regard to the consumption of digital content is a first step towards shifting the Digital Scholarly Edition from a simple information source to a truly interactive research experience.

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Design as Part of the Plan: Introducing Agile Methodology in Digital Editing Projects

Ginestra Ferraro and Anna-Maria Sichani

Abstract

This paper aims to discuss where we currently stand with regard to design planning in digital scholarly editing from a project development perspective. In the last two decades, a huge number of digital scholarly editing projects have been developed by introducing and challenging different concepts, methods, workflows, tools, and techniques to and within the textual scholarship community. Although the majority of digital scholarly editions have been typically bound to a project-based logic, very few are actually developed and operate within a solid project management and product development framework. Such a behaviour, we claim, often has the result of limiting digital editing projects to the sheltered boundaries of the known environment, when it could potentially enhance the value of the final product and help it move towards a dynamic development framework such as the commercial world of web publishing and communication.

1 Introduction and context

In the past two decades, digital scholarly editing has been developed and established as an evolving and pivotal field of Digital Humanities and textual scholarship in general, as recent accounts argue (Pierazzo 2015; Driscoll & Pierazzo 2016). A significant and growing number of digital scholarly editing projects have been developed by challenging old and introducing new or different concepts, methods, workflows, tools, and techniques to the textual scholarship community. Digital scholarly editions (DSEs), among other resources, help those involved to shape a practical understanding of what it is to conduct research and produce scholarly output within the *digital paradigm* (Sahle 2016 28–33) while experimenting with operational procedures that exceed the traditional Humanities research agenda. Although the majority of DSEs, as it is common in Digital Humanities practice (Burdick et al. 124), have been typically bound to a project-based logic, very few of them succeed to be fully developed and operate within a solid project management and product development framework.¹

¹ For a recent account and proposal on the topic of sustainability in digital editing projects, see also Czmieł 2016.

Within such an understanding of digital editing projects, usually discussions and decisions regarding (interface) design, functionality, and user needs come (if ever) as a final and mere presentational step. In addition, little time, budget and space for experimentation is left for design *per se* while the repertoire of possible interface choices or solutions might be further limited due to the technologies adopted in the process. Such behaviour often has the result of limiting digital editing projects to the sheltered boundaries of the known environment, although integral and innovative explorations could potentially enhance the value of the final product and help it move towards a dynamic development framework, similarly to what happens in the commercial world of web development, publishing, and communication.

This article aims to discuss and situate design planning within a robust while flexible project development framework for digital editing projects. Not surprisingly, in the last two decades, we have witnessed a remarkable growth of interest towards how computational technologies radically change the ways we structure, document, and process our scholarly editing data while revolutionising its scale (a good overview can, for example, be found in Driscoll & Pierazzo). Design, on the other hand, tends to be neglected despite the fact that it plays a vital role in Digital Humanities and the digital editing agenda as, from the outset, it communicates with technological evolution and enables user accessibility and engagement. Even if an experimental, interdisciplinary and collaborative ethos should be at the very epicentre of Digital Humanities scholarship, valuable and fresh approaches from the fields of project planning and development with regard to sustainability and user engagement are not usually part of the project planning.

In our paper, we propose to use *design* as a more comprehensive term than *interface*. Thus, we set to explore two central aspects the word *design* can represent in our case:

1. design as information architecture.
2. design as user interaction.

We will endeavour to explore the different aspects listed above, focusing on how planning enables sustainability, how content-driven design enhances the research subject and how usability and user input could contribute to the digital editing project itself in the long-term. Furthermore, by researching which workflow(s) could provide benefits to both the academic and the technical components of the project team, we will introduce an Agile-oriented workflow in our digital scholarly editing projects.

We will support our proposal by introducing the King's Digital Lab (KDL) workflow for digital editing projects, which includes both the project management and the development sides. By using *The Value of French* (TVoF), a digital edition developed and maintained by KDL as a case study, we will discuss where and how information architecture (IA) and user experience (UX) come into action and, further, set the foundations for generating well designed, sustainable, and usable digital editions. It

is to be said that what will be presented with regard to design and UX good practices is not exclusive to DSEs, it is, indeed, applicable to many web interfaces. We aim to highlight what the benefits are in particular for digital editing projects and why it is important to introduce such good practices at an early stage in the planning process.

1.1 Project development models

DSEs vary substantially as they may be composed of a heterogeneous set of outputs. Even if there have been several attempts to document and categorise existing digital editing projects,² there is no single model for developing and creating a digital edition. Differences may include the research questions, the nature of primary material, the standards and technologies employed, the budget, or the team size. Even if the actual development and delivery of each digital editing project is unique, all of them face the same project-based limitations: time, costs, and features. The ability to be flexible becomes the key when approaching a new research project. The main issue is the investment, more specifically time and money, which are often limited and represent the biggest constraint.

The **Waterfall approach** (fig. 1) is a project development methodology that has proven effective when all requirements are mandatory and described in detail, when funding is largely available and more money can be accessed if needed, and, finally, when time is not a strict limitation.

To set fixed features we would have to consider cost and time to be flexible. Based on the authors' personal project experience – and this is true for most projects that require any development – it would be naïve to think that, once funding and time run out, more work will be done without incurring further costs and obstructive issues (e.g. delays, personnel turnover, etc.).

It is evident that with research projects funded for a limited period, these conditions are not met, and this is why we think the **Agile approach** (fig.1) works better for DSE projects. Introducing the reverse Waterfall approach, intrinsic to the Agile methodology, in our management and development procedure will be beneficial to such projects.

2 Dynamic development framework – Agile in a nutshell

The Agile approach is a dynamic development framework for planning and guiding projects that support an iterative, flexible, and dynamic approach to development by

² Two model attempts of documenting digital scholarly editions are Patrick Sahle's *Catalogue of Digital Scholarly Editions v 3.0* and Greta Franzini's *Catalogue of Digital Editions*; both of them are intended to survey and document best practices.

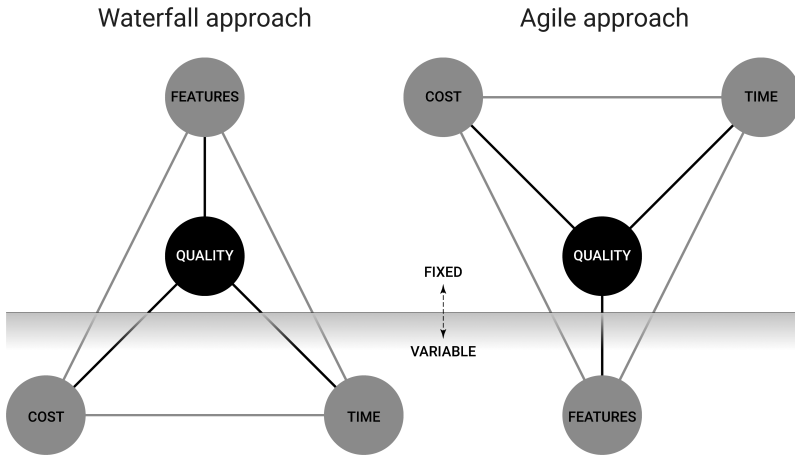


Figure 1: Waterfall approach (left) vs. Agile approach (right).

splitting the work into smaller tasks and assigning them different priorities. This dynamic development framework was adapted from the software development industry where it was first conceptualised in the '60s and established in the '80s as the Agile Methodology (Denning 2015).

The Agile way includes accepting limitations, variables which cannot be altered or fought against at times, and work with those variables which we can control without compromising quality. Reversing the Waterfall approach and fixing cost and time early would allow to focus on the scope of the research project, defining what the final *product* 'must, should, could, and won't' be (more on this when we explain *MoSCoW* prioritisation later in this paper).

If a priority list of features is not generated, there is a risk of under-committing, or worse: over-committing. The result would be an unfinished project, likely to remain incomplete until forgotten. Moreover, such a list is useful to define project stages, product releases, to set targets for the future, including following bids for more funding and further research ideas. It ensures the project is on track, meeting its deadlines, and the overall quality requirements are met.

By prioritising features, the development team builds a framework that guarantees the deployment of a Minimum Viable Product (MVP), so that, even in the worst case scenario, a working application is still produced. If the research and associated development process progress seamlessly without taking unanticipated turns, all features are developed and the product is built in the best possible way. In order to guarantee

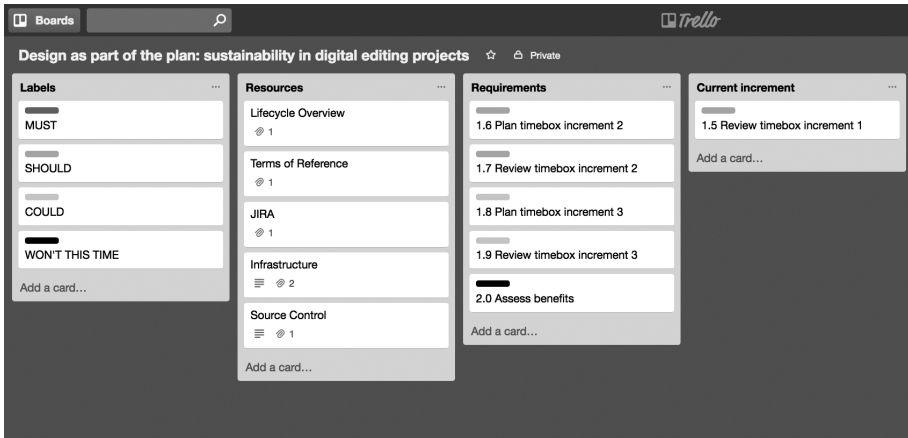


Figure 2: Example of a Trello board displaying work in progress on a project approached with the Agile method.

quality, it is a necessity to be transparent from the beginning and acknowledge that some features are more important than others. The key ones will form a solid core and building around them should lead to a product that is not only viable, but also scalable.

Project managers have adopted Agile to support a more flexible approach allowing for faults to be discovered early in the process and ensure a successful and functional final product. Agile is very much en vogue now (Ambler 2013; Hastle & Wojewoda 2015), whilst the Waterfall model has been widely abandoned in project management and product development procedures (fig. 2).

As mentioned above, Agile is not a new technology and its success is well documented in the Agile manifesto (Beck et al.) as well as in Larman and Basili's paper about "Iterative and Incremental Development" (IID) (2003), where various examples are listed. They also highlight the importance of iterative design and, even more so, user centred design:

The paper [i.e. Basili & Turner 390–396] detailed successful IID application to the development of extendable compilers for a family of application-specific programming languages on a variety of hardware architectures. The project team developed the base system in 17 iterations over 20 months. They analyzed each iteration from both the user's and developer's points of view and used the feedback to modify both the language requirements and design changes in future iterations. (Larman & Basili 50)

The *DSDM Agile Project Framework Handbook* lists the following key aspects of Agile development:

- *Iterative design or incremental design:*

The ability to break a big problem (a project can be seen as the *big problem*, the end deliverable) into smaller tasks that can be solved/developed quickly and often by independent parties, allows for quick evaluation, as long as frequent checkpoints are in place along the path. (See *Face2face collaboration* below.) This is valuable especially for collaborative projects, where being able to progress separately is sometimes necessary. An increment is the set of functionalities/tasks that are to be developed in the time allocated to the iteration. While the scope of the entire project is defined and analysed at a high-level degree in the early stages, iterations are planned little in advance, leaving room for adjustments, should the project need to modify its course (DSDM 21, 62).

- *Willingness to explore and adapt:*

We could argue that this concept is naturally embedded in research, hence technical development conducted within the research context will follow the same process, whereby tools are built around the necessities yielded by the content and tested by the end users, rather than the other way around (i.e. shaping the content to fit an existing container that might not be fit for this purpose), then we can see the potential gain for both technology discoveries and for content enhancement (DSDM 144).

- *Responding to change:*

At the end of every increment, there should be an evaluation phase to determine whether the progress made is in line with expectations or whether adjustments need to be made when that is not the case. While working on ongoing exploratory subjects, it is not uncommon to discover the initial plan does not fit anymore, for example because one aspect emerges as more relevant than another. Ignoring it, leaving it unexplored, could damage or at least limit the outcome of the project. As mentioned above, iterations are a list of functionalities that need to be implemented in each increment. The fact that every iteration is a small part of the project gives room to steer direction, adapt, with little waste of time and resources (DSDM 45, 72).

- *Face2face collaboration:*

Agile recommends daily, short meetings among team members, called *Stand-ups*, to share individual workload and identify potential conflicts or expose issues in solving tasks. Meeting in person is recommended, but technology has reached a point where tools can make it reliable to create virtual meeting rooms and ensure the communication channels are effective (DSDM 133).

- *Valuable product:*

Whether in its rawest or most elaborate form, from downloading data and source code to interacting with complex search dashboards, a DSE requires a user interface to be displayed or explored in more nuanced ways. The attempt is to always reach a point, after every iteration, where a usable product is available, something that can eventually be improved and expanded but ultimately possesses the key features to stand on its own. This is called a Minimum Viable Product (MVP), a product that is functional and valuable because the minimum requirements are always satisfied (if not, the project fails). And this is why prioritisation is so important (DSDM 121).

Surveys from Ambysoft (Ambler 2013) and CHAOS (Hastle & Wojewoda 2015) are backing up the trend, showing a higher success rate for projects approached with the Agile methodology. Nevertheless, there are a couple of issues still at stake:

- *Scalability* is an issue identified by the software development community as one of the main drawbacks of Agile.

Scaling Agile is indeed a problem, because the Manifesto doesn't scale in the first place. It was *intended* to describe small projects, not large enterprises. However, *agility* of complex systems is nothing new. [...] It is not people over processes but bottom-up rules over imposed constraints. Not working software over documentation but holistic development over schismatic thinking. Not collaboration over negotiation, but positive communication over negative assumptions. It is not responding to change over following a plan but scaling out over scaling up. (Appelo)

Where projects have a list of very detailed features, and they are all required for the product to be acceptable and functioning, it is quite clear that there is no contingency other than the time to build them all. In this situation, Agile would not be required. The argument between fixed and flexible aspects of a product is not the only one to make a case against Agile. The effort required from the staff of every team involved should not be underestimated. Every individual has to understand the process, at least broadly, and actively participate and contribute.

- *Collaboration* is a recurring word when addressing issues and it is, in fact, key to the success of any project. Technology offers a wide range of tools to support collaborative work: from cloud-based platforms to sharing tools, video/audio conferencing applications and so on. That said, not all work environments and not all projects allow for collaborations; there could be physical limitations, time limitations, policies that would make it very difficult to follow the process described above.

There is one important point to be made here: although procedures need to be in place and documentation has to be written for products to be maintainable, the time

spent on quantifying how long those tasks will take, should not outgrow the time spent on actual research and development. To produce documentation is a necessity in higher education and cultural heritage institutions, and in general, wherever public funding is the main source for financial support. Workflows and templates attempt to relief and smoothen the process, optimising time and resources available to focus on the core development of the product. It is important to notice that, although every DSE is unique, there are similarities among projects, recurring features for instance, that, once developed, could be reused as modules on different products.

As for the prioritisation of tasks in an Agile framework, the MoSCoW approach is adopted. MoSCoW stands for ‘Must, Should, Could, Won’t do this time’ and it defines the priority levels assigned to tasks at every increment. It’s a method developed by Dai Clegg (1994) while working on Rapid Application Development at Oracle UK and was soon adopted in project management.

Going through the list of requirements and adding priorities to each element highlights what the final product should be able to do at its core. Anything other than *Musts* should be considered contingencies. It is still important to know which features would contribute the most to the overall experience, and stress they *should* be implemented to add value to the final product; which attributes would be a nice addition, but do not affect the product’s performances, and finally, what vision the project has for further development of the application (development of extended features can, for instance, be included in new funding proposals). What the Agile approach suggests is a rough split of 60% *Must*, 40% *Should*, 20% *Could*. (*Won’t have this time* is not considered when balancing priorities) (DSDM 118–119).

3 Design planning and Agile workflows in digital editing projects

We propose that by adopting an Agile-oriented workflow in our digital scholarly editing projects we could implement a robust and flexible design strategy for our digital editions: discussions towards design specifications will normally arise from the very beginning through a medium/technology agnostic approach, succeeding thus to focus on what the target audience actually needs and wants to do with the resource, through an iterative development process based on task prioritisation. Such an undertaking liberates the digital editing activity and its outcomes from technological dependencies, facilitates its (future) repurposing for different audiences and uses while ensuring its viability in the long term. Furthermore, in an Agile workflow, there is plenty of room for experimentation; testing, customisation, and user feedback play a vital role in the whole process.

Flow

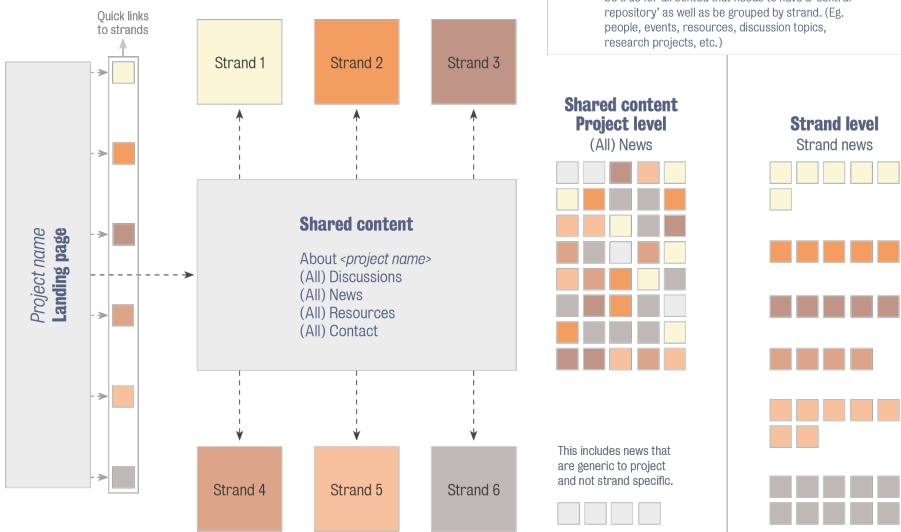


Figure 3: Content flow and distribution: mapping the content and analysing how grouping changes in relation to users' selection.

3.1 Information architecture

For any product to succeed with its intended users, it has to be clear what it does and how it is to be consumed. Information architecture (IA) helps define what users are expected to do with the content delivered and how to interact with it. It is rare to find a single person to take on the role of an IA designer; more often, this profile is covered by multiple team members partially overlapping and creating the structure for the project to build upon. Content analysts and designers, user interactions designers, and software developers work closely with project investigators to frame the objectives set in the funding proposal and build an IA around the content (fig. 3).

The word *users* is intended in a broad sense here: users can be the group of people taking part in the research process and using tools developed to generate the desired output, but also the general public exploring the publication after its release. For instance, ingesting data from a source might require performing custom operations (adding metadata, reordering, cleaning up formatting, annotating, etc.), hence a tool is developed to satisfy the requirements for the researchers (*users*) to complete those actions or a dashboard to allow the general public (still *users*) to query a dataset.

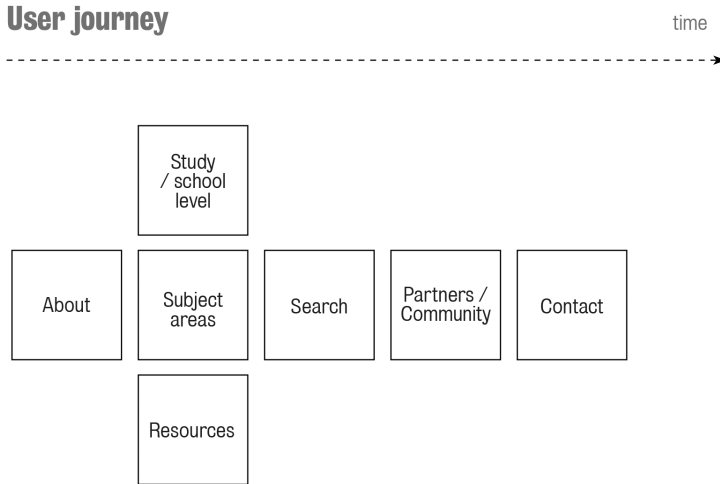


Figure 4: An example of user journey to identify content areas a specific persona could be interested in.

There are multiple ways to dynamically develop and design an IA for a digital edition. For instance, it is useful to present content maps and conceptual designs early in the process, generally in the first increment of the evolutionary development. Workshops are a good means to achieve both a shared understanding and establish focus.

Products such as a list of personas, user journeys, as well as content maps and conceptual designs (from mood boards to content flow diagrams) are the outcome expected from such workshops. Creating personas is a way to validate whether the imagined target audience is indeed the right match for what the project is offering. The user journey is a thread across the project concept, the choice of language, and the design that will provide the interaction – in other words, it is how the messenger delivers the message successfully (fig. 4).

The benefits of starting design early are multiple, but the most important are:

- Shared understanding of what the final product is expected to be.
- Focus on content and users.
- Build-in layers (using MoSCoW prioritisation).

3.2 User interaction design

Designing and developing ad hoc software is a considerable undertaking. Off the shelf tools are available in the market nowadays; it is difficult to imagine having to build something from scratch. However, it is easy to fall into a deep spiral of customisation as soon as the adopted tool does not offer the exact functionalities needed.

The development team makes decisions to balance out different issues: not wasting time creating something that already exists on the one hand, and, on the other hand, making sure the content is fully enhanced and supported. Creating experiences is what user interaction designers do when they add colours, shapes, animations, and actions to the concepts initially presented in content maps, user journeys, and conceptual designs. The architecture is in place and it is time to *translate* it to an interface and to add new layers.

While the gathering of research data and creation of models to make sense of it is undoubtedly the priority and the core of the research, the user interaction stage is when the results and resources become available. Data needs to be displayed in a way that users can understand, search, and explore in order to gain insights of what the research has achieved: that is what a user interaction design and its main output, an interface, usually do.

We have already discussed the concept of building modularly for both self-containment and reusability purposes. Interaction design is no different: components can be identified, prioritised, designed, developed, tested, deployed and *reused*.

Being an effective designer means more than just creating great designs for the user. You need to learn to create the right design for your users *and* your team. Over time the effective designer learns to evaluate their work not by the quality of their design, but by the impact of what actually ships. That's what makes the effective designer valuable, because a great design that sits on the shelf doesn't solve real problems. (Barnard 2015)

We argue that the quality of design benefits from the impact the product itself achieves on its users, but overall, the authors agree with Leon Barnard, and suggest that getting the design right first is a *Must*, making it great or enhancing functionalities is a *Should* or *Could* where resources are available.

Design happens and interlaces across many phases during the development workflow. Moreover, roles from different teams are involved in the process. By introducing and implementing a multifaceted, flexible and iterative design strategy during a digital editing project, we are working towards the creation of a scholarly product that is usable, fulfils the various user requirements and can introduce multiple navigation and processing paths for the user.

An iterative design approach further enhances a digital edition to be maintained in the long-term. For Jerome McGann, “‘sustainability’ is a dark but potent word in the field of digital humanities. It signals a broad set of concerns – they are both technical and institutional – about how to maintain and augment the increasingly large body of information that humanists are both creating and using” (McGann 5). The iterative development process and the easiness to respond and adapt to change could be seen as crucial components of a sustainability plan for a digital editing project. As the majority of the digital editions are developed within strict funding time frames, the proposal of employing an Agile approach for their design, both in terms of the information architecture and its interface, ensures that the digital edition can be efficiently adapted to technological advances or data changes. Design planning helps create digital editions that are useful, usable, and used even after the funding period.

4 KDL workflow applied to DSEs and other projects

In order to better explain our argument, we are going to focus on the King’s Digital Lab’s workflow for digital editing projects. King’s Digital Lab was established at King’s College London in 2015; the team includes analysts, designers, and research software engineers whose main focus is to liaise and contribute to a variety of projects across (but not limited to) the Faculty of Arts & Humanities, with a strong tie-in with Digital Humanities in the first place. KDL mainly develops research solutions iteratively, using a range of tools and processes that can handle the most common challenges of digital research in the humanities and social sciences. The lab builds resources designed to address research questions, store content, publish results, and push the boundaries of computationally-intensive research.

KDL has adopted the DSDM Agile methodology which, although not suitable for every project, has proven to be effective for all the ones we considered viable. The workflow (fig. 5) is a tailored version of the Agile approach previously mentioned in this paper and identifies the various phases we use to keep a project healthy and on track:

- *Pre-project* determine whether a proposal is of interest to the lab.
- *Feasibility*: analyse requirements at a high level to check whether they are cost effective.
- *Foundation*: expand the requirements, define the roles of the people involved, and start planning the first increment.
- *Evolutionary development*: develop iteratively and build incrementally, with constant communication between the parties involved, making sure the development is user centred and content driven. Should the focus of the project shift slightly,

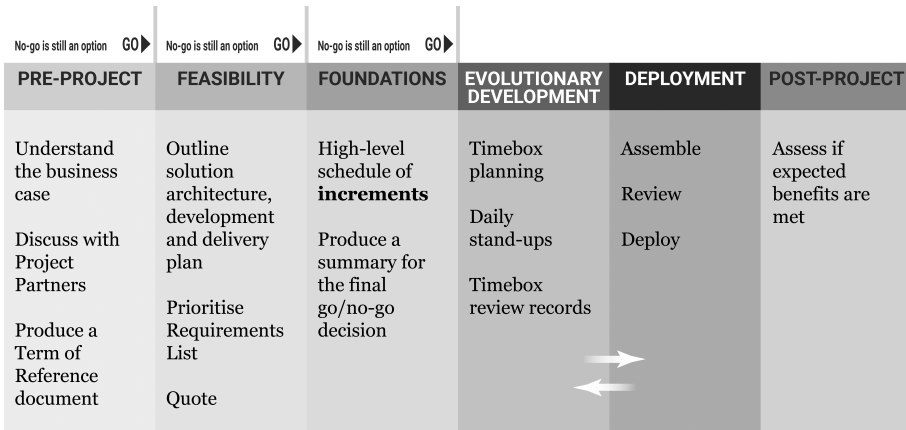


Figure 5: A simplified version of King's Digital Lab Agile workflow.

this phase allows for adjustments. Reacting to change without dismissing new opportunities or losing sight of the project's objectives becomes easier and constructive when 'health checks' are performed frequently.

- *Deployment*: at the end of every increment, test the feature(s) developed and, depending on the status of the project, consider a product release. Issues arising in the current iteration should also be recorded and evaluated to check whether they will affect the future increment(s).
- *Post-project*: work in collaboration with project partners to assess if the desired benefits are met (measure success).

For KDL, the Agile framework ensures a sustainable development cycle for DSE and other digital projects alike:

- Setting up an iterative workflow and following up with an evolutionary process helps assessing the status of the project, hence its sustainability.
- Focusing on incremental design to produce modular components that can eventually be abstracted from the specific project and reapplied to (or readapted for) other products.
- Responding to change dynamically and adapting to avoid mummification and obsolescence. Application Lifecycle Management is envisioned as a central element of the KDL Software Development Life Cycle (SDLC), e.g. by including a 'Forward Planning' section in our product quotes that define possible future archiving options or ensuring our SDLC includes post-project maintenance.

The lab ensures that every project enters the cycle in a healthy state, meaning that it has successfully passed the pre-project phase and is ready for evolutionary development. While that is possible for every new project, KDL did inherit a long list of legacy projects from its previous presence as part of the Digital Humanities Department (former Centre for Computing in the Humanities). Thus, the topic of design as part of the plan and as a means and an important factor for sustainability has to be considered. What follows is a case-study of a DSE project showing the KDL team efforts towards the application of design planning and into an Agile framework.

4.1 *The Value of French* (TVoF), a case study

The Values of French examines the nature and value of the use of French in Europe during a crucial period, 1100–1450, less in terms of its cultural prestige (the traditional focus of scholarship) than of its role as a supralocal, transnational language, particularly in Western Europe and the Eastern Mediterranean. (TVoF, About)

The challenge for the *TVoF* project (ERC advanced grant) with regard to DSEs is to design a text viewer allowing both scholars and the general public to browse and compare transcripts of manuscripts side by side as well as to displaying notations and highlighting and synchronising changes across versions and so on. The design has to reflect the editorial choices made by the team of scholars and enable users to access the considerable and detailed amount of information available. It is also important to support the perspective under which the subject is treated as well as to ensure consistency and integrity to lay the basis for further research on the topic. When the initial proposal is evaluated in the *pre-project* phase, both the technical and the editorial aspects represent an opportunity for KDL to explore new ways for side by side text display with the aim of discovering patterns or highlighting inconsistencies in the manuscripts.

Typically, focusing on content, a team of developers, designers, and scholars discusses the requirements (features) and assigns priorities. From a design point of view, “a mobile-first workflow helps us to prioritize content, since there’s not enough room on a small screen for non-critical content” (Wroblewski 28; Jehl 55) (see fig. 6).

As a DSE, *TVoF* aims to answer the researchers’ questions, but also allows them and other users to explore patterns in the corpus. The user interface has to facilitate the ability to confirm or disprove theories by visually displaying various versions side by side, toggle annotations and comments, and allow for critical analysis.

Following the *evolutionary development* phase mentioned before, few increments of design take place. Scholars and the UX team work closely together to test the

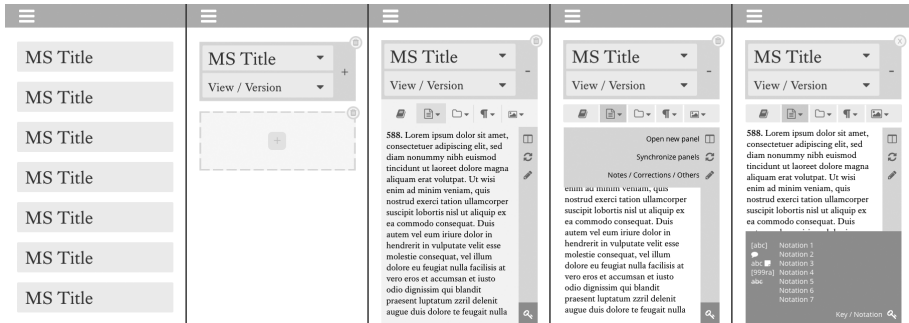


Figure 6: First, exploratory design draft. The *mobile first* approach helps focussing on content and key features for the Minimum Viable Product.

interface. Based on user feedback, elements are added to or removed from the design so that the application satisfies the user interaction required.

The view is customised as soon as users interact with it, offering a personalised experience. This level of options will account for a wide range of uses of the product as well as different types of users. While a simple alignment of paragraphs as recorded in two different versions might be useful when explaining to early career scholars how editions change in time, a more sophisticated audience will be interested in textual elements omitted and corrections made in subsequent releases, word repetitions, spelling evolution, etc.

Making the UI appealing and easier to use for the aforementioned types of audiences does not mean removing or hiding the complexity of the work done ‘behind the scenes’. The purpose of this online product is to engage its users and offer different entry points or angles of examination. Accounting for user interaction while ensuring the look and feel is also taken care of leads to a somewhat parallel progress of graphic and software design. Once both aspects reach a satisfactory level of development, the application is ready for the first round of deployment, bringing the design mock-up to life (fig. 7 and fig. 8). In an Agile environment, deployment does not coincide to the product launch for public consumption until the last iteration, but allows for evaluation before the next round of changes takes place. Bugs are fixed and adjustments are made early, making it possible to trace back the evolution of the product.

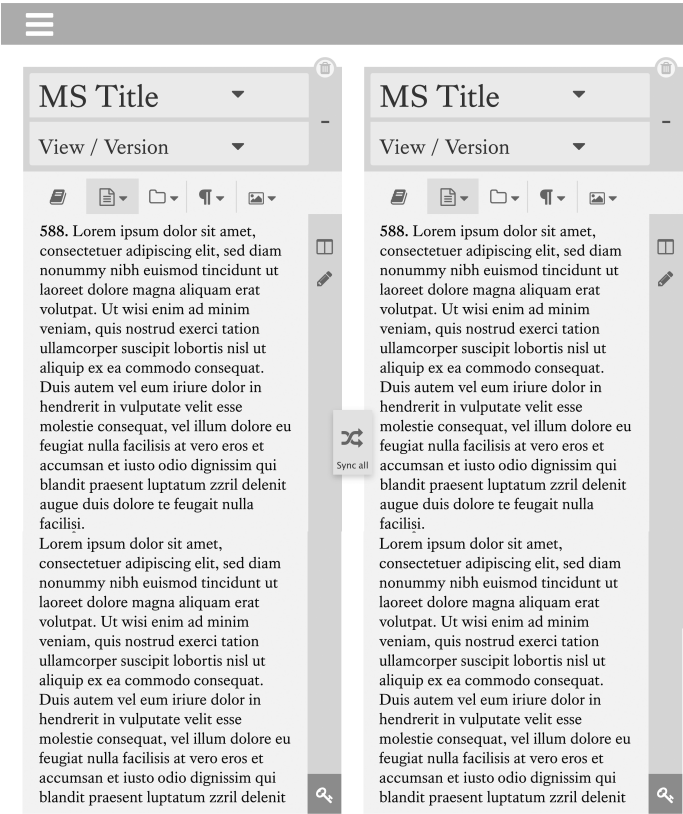


Figure 7: The mock-up represents the first design based on user experience comparing text sources side by side.

4.2 Visual vs. Text

Designers make informed decisions whenever they *impose* their visual representation of data on users, but sometimes it is recommended to at least broaden the spectrum of perspectives and offer the users an array of multiple options (fig. 9, fig. 10, fig. 11).

There are situations which call for allowing users to be in charge: choosing a specific display might have to do with disability and/or technical reasons. For example, a person affected by dyslexia might find it easier to search a map or explore a graph, whilst a visually impaired user would benefit from aids such as screen readers reading lists and other textual representation. In a situation where network coverage or

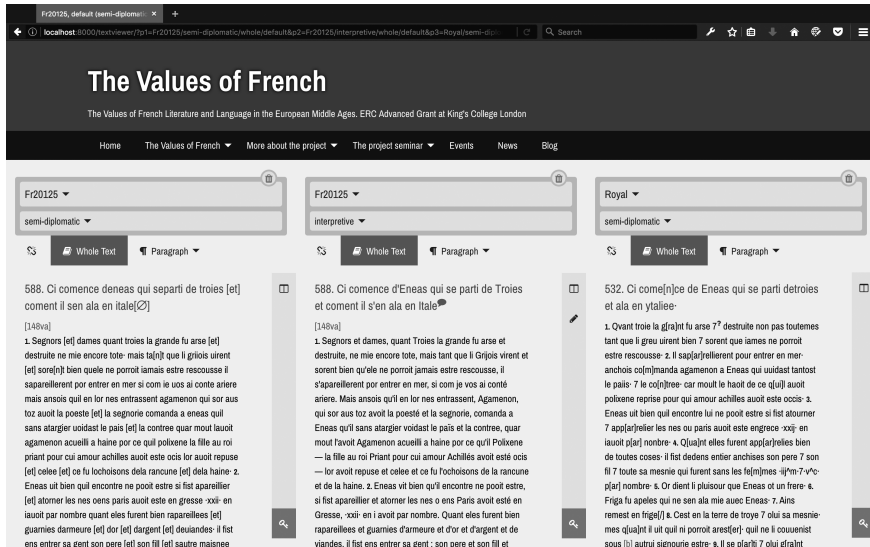


Figure 8: First release of the text viewer user interface, comparing different versions and synchronising paragraphs.

data transfer are limited, a textual representation would load quickly and use fewer resources whilst still providing the user with a fully functional experience of the application. Finally, even DSEs might need to go back to a paper format when a user finds it necessary to print out some material. Some flexibility should be left to the user to decide which output to rely on in specific contexts (e.g. searching vs. reading).

5 Concluding remarks

Of course the approach presented in the paper can also be applied to non-DSE projects, but it is the intention of the authors to contribute in the search for answers to some of the questions posed in Sahle's paper, in particular:

Does the edition follow a digital paradigm? Does it make use of the possibilities of digital technology and media? Is it not printable without a major loss of content and functionality? (Sahle 13)

We claim that by integrating design, both as a conceptual framework and as a methodological awareness, early in the development process of a Digital Humanities project and, more specifically, a digital editing project, we can succeed in the creation of high

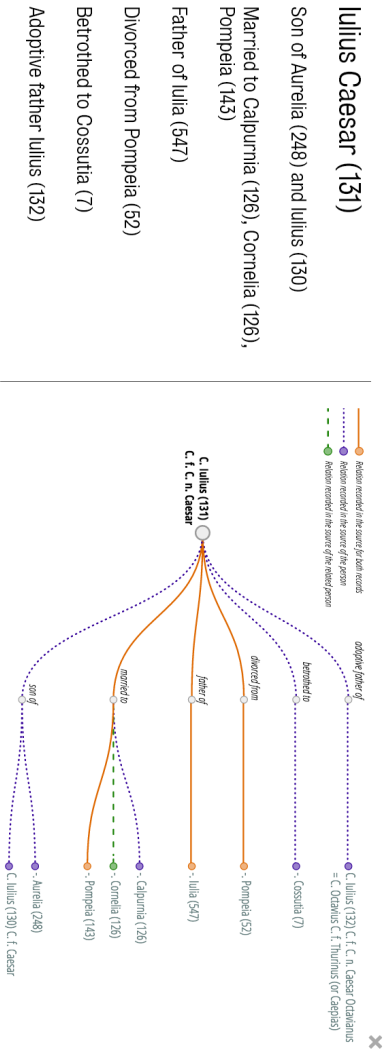


Figure 9: Text and graphic representation of Julius Caesar's family network based on data extracted from Digitising the Prosopography of the Roman Republic.

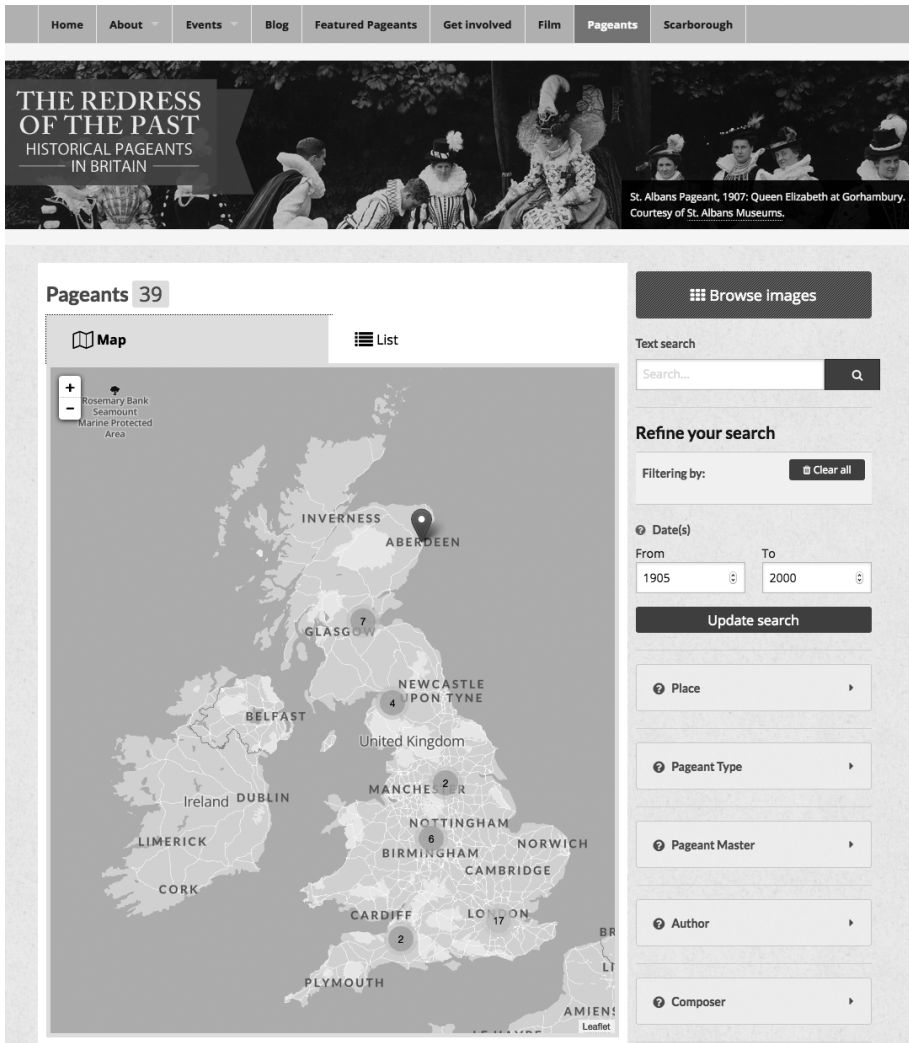


Figure 10: Map view.

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Featured Pageants

Get Involved

Film

Pageants

Scarborough

THE REDRESS OF THE PAST
HISTORICAL PAGEANTS
IN BRITAIN

St. Albans Pageant, 1907: Queen Elizabeth at Gorhambury.
Courtesy of St. Albans Museums.

Pageants 39

Map

List

1. Mary Queen of Scots Pageant

The pageant formed one element of a fete in aid of the Scottish League of Pity. There was news coverage in the Scotsman.

2. Scottish National Pageant of Allegory, Myth and History

This was a fundraiser for the Scottish League of Pity, and was advertised in the Dundee Courier and the Scotsman newspapers. The pageant may have been processional in form, but it is not clear from...

3. Pageant of the Bruce

During the Scottish Exhibition of National History, Art and Industry, two short pageant plays were staged (Pageant of the Bruce in September and Thomas the Rhymer in October) A further play about R...

4. Thomas the Rhymer

During the Scottish Exhibition of National History, Art and Industry, two short pageant plays were staged (Pageant of the Bruce in September and Thomas the Rhymer in October) A further play about R...

5. Robert Burns Pageant

During the Scottish Exhibition of National History, Art and Industry, two short pageant plays were staged (Pageant of the Bruce in September and Thomas the Rhymer in October) A further play about R...

6. Scotland's Crown

This was a Girl Guides Pageant. It was written and directed by Molly Clavering who was also responsible for a Girl Guides pageant in the Borders.

7. Aberdeen Coronation Pageant

This was billed as a tattoo and pageant. There was also a parade and concert. The pageant had five episodes but it's unclear what form they took (on floats? tableaux?). There was some coverage in t...

8. Arbroath pageant 1954

In July 1954, the Aberdeen Evening Express carried an advertisement placed by the city's branch of the Scottish Covenant Association; this promoted a bus tour to the Arbroath Pageant to be held the...

9. Army Pageant

Browse images

Text search

Search...

Q

Refine your search

Filtering by:

Clear all

Date(s)

From

To

1905

2000

Update search

Place

Pageant Type

Pageant Master

Author

Composer

Figure 11: List view.

quality digital scholarly outputs which are accessible and sustainable. Embracing the Agile philosophy from the start means not only adopting a management option, but also embracing an operational mindset and a set of procedures committed to collaboration (ask for feedback early and frequently), iterative development (apply changes based on feedback), flexibility (embrace change), direct communication, and creativity (all parties involved need to feel comfortable in contributing to the product). By approaching a project with such a mindset, we believe the resources available will be optimised and focused on the core of the research: exploration and result analysis.

As exposed in the case study through the phases presented in the workflow, different roles are involved in various stages. The advantages of reasonably quick iterations and deployments (from two to four weeks) as well as an open communication channel allow for a fast evolution of the tool, moving constantly forward with the occasional step back and redesign of details when user testing fails. An example in our case study is represented by the synchronisation button (fig. 7), not included in the first deployment (fig. 8) after testing showed that the DSE behaviour did not match the user expectations. It might be implemented in future developments or dropped completely depending on prioritised requirements as well as time and funds available.

Due to the interdisciplinary nature of Digital Humanities projects, this approach allows for a better understanding of all roles involved and helps building a common vocabulary where all parties can fully contribute to the success of the research process. Technology should eliminate barriers (not be one), act as enhancer and facilitator, and be shaped by the content rather than box it with limitations. Furthermore, the interaction ultimately generated by users is an important outcome that could move the research forward and become part of a constant evolution (e.g. interaction generating data to be included then in the project itself, whether for subsequent phases or for results evaluation).

Finally, the proposal of introducing Agile methodology in digital editing projects is placed in the epicentre of and celebrates the collaborative and interdisciplinary ethos of Digital Humanities. From the IT industry, we do not just borrow the methodology, but also their 50+ years of experience with it. This approach will not be applicable to all projects, but there is enough evidence to consider the methodology a valuable option to be applied to DSE projects.

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The Interface in Practice

Interfaces in Digital Scholarly Editions of Letters

Stefan Dumont

Abstract

Like no other text type perhaps, the scholarly edition of correspondence has benefited from digital methods in the past fifteen years. Firstly, the graphical user interface enhances the accessibility and usage of edited letters in a significant way. Secondly, by providing and using application programming interfaces, much better than a printed edition the digital scholarly edition addresses the characteristics of the medium “letter”. This article discusses these developments against the background of the discussions in scholarly editing in the 1980s and 1990s and shows the best practices today for interfaces in digital scholarly editions of letters.

1 Introduction

Letters are relevant historical and literary sources for many disciplines and have thus been made available to research in scholarly editions for a long time. Yet, they constitute a type of text on their own with particular characteristics which influence their presentation in scholarly editions.

Letters usually contain quite heterogeneous content referring to the most diverse present or past events, persons, publications, or topics. Because of this great variety of topics, it is often complicated for the modern reader to determine the relevance of a letter or of a set of letters for his or her own research without having read them all. Unlike scholarly papers, reviews, newspaper articles, books, etc., letters do not contain a title which would give users a first impression about what contents to expect (Mücke 89–90; Csáky et al. 84).

Besides the heterogeneity of content, another characteristic feature of letters is that in general they were written with a certain recipient in mind. First, this may entail that certain issues discussed cannot be easily understood by the modern reader, because they were only explained to the extent required for the conversation between the writer and the intended recipient. The modern reader often lacks the background knowledge needed to fully understand what has been written. Providing this knowledge by identifying the persons, publications, events, etc. mentioned in a letter is an important task of scholarly editions (Leuschner 184). Furthermore, the concentration on one recipient results in a special subjectivity of letters: the writer might share opinions or events with one specific recipient, which he or she would talk differently about, if at all, to a different recipient. Thus, the context of a letter is important, i.e.

the specific relationship of the correspondents, the character of their correspondence so far, or the different ways used by one author to describe or judge similar issues towards different correspondence partners (Bischof 293; Mücke 89).

This leads to another characteristic of letters: often (though not in all cases), one letter is part of an entire exchange of letters, i.e. of a certain “dialogue” between two (or more) correspondents. The researcher has to be aware of this dialogue. Equally important is that the letter has to be considered as part of a larger correspondence network in which information and opinions circulated and were (or deliberately were not) exchanged (Allroggen and Veit 142; Le Guillou 196).

Finally, the physical properties of a letter have to be taken into account when determining its characteristics. Is the writing legible and clean? Or was the letter drafted in a hurry and the writing object to later corrections and additions? Which kind of paper was used? Does the way the sheet of letter paper is segmented (i.e. the layout) indicate if the letter is meant as a formal, conventional document or as a brief note between friends? This materiality has increasingly been considered significant since the beginning of the 2000s, which was also reflected in the discourse of scholarly edition studies and editorial practise (Richter, “Goethes Briefhandschriften digital” 65).

The following outlined developments of interfaces are, of course, only possible if the information on the aspects discussed above is contained in the data and can be queried. Nowadays, digital letter editions are mainly based on TEI-XML data, which can provide all the information required for the listed interfaces. Unfortunately, there are currently no standard guidelines for coding letters in TEI-XML, but the edition guidelines of the *Carl-Maria-von-Weber-Gesamtausgabe*¹ or *edition humboldt digital*² give a good overview of the state-of-the-art in the modelling and annotation of letters. Stadler et al. can be consulted for detailed information on annotating the most important metadata of a letter.

The specifics of the letter as a particular type of text mentioned above have been long discussed in the community of editorial scholars and thus have been taken into account for the conceptual planning as well as the realization of digital editions of letters. This article will discuss these developments in order to provide an overview of the current state-of-the-art in the digital scholarly editing of letters. In so doing, it will outline particularly how digital interfaces – both graphical user interfaces (GUIs) and application programming interfaces (APIs) – help overcome the problems of printed scholarly editions of letters.

¹ weber-gesamtausgabe.de/de/Projekt/Editionsrichtlinien_Text.html.

² edition-humboldt.de/richtlinien/index.html.

2 Graphical user interface

Just like in the printing age, presentation is an important issue of digital scholarly editions (DSE). It is only through the presentation that the letter texts, which are usually encoded in TEI-XML, become readable and can be used for hermeneutic research by resolving encoding and links. Hence, even though data is at the core of a digital edition, it cannot be imagined without its presentation (Sahle 159). In contrast to a printed scholarly edition, the presentation of the edited text is not just static, but an interface that allows readers to interact with the material. With a graphical user interface, users may select specific data from the text corpus, choose between different modes of display and follow links between different documents. Readers may also apply queries to the material which were not anticipated by the editor, e.g. via full-text search. This way, the readers actually become users of the digital edition. The graphical user interface thus is a constitutive feature of the digital edition by which the latter is distinguished from the printed and even the retro-digitized edition, if transformed only to a PDF. A scholarly edition published in PDF format does not have a graphical user interface and, strictly speaking, can thus not be considered a digital edition (Sahle 120).

In the past ten to fifteen years, the development of graphical user interfaces for digital scholarly editions (of letters) benefited immensely from the development of web technologies in general. The situation in the 2000s, when the variety of formats, scripting languages and browsers at hand was still hugely limited, has fundamentally changed by now. For example, in 2006 a primary problem was cross-browser compatibility, CSS was adapted only little by little for website design and the possible fields of application for Javascript were very limited. In 2017, when this paper was written, this situation appears completely different: apart from brand-new features, there are no major differences of processing between the different browsers any more. The spectrum of functionalities of HTML and especially CSS was extended immensely, above all to the effect that websites can now be designed with typographical elements (e.g. special fonts) to a much greater extent than before. This is specifically reflected by the development of suitable formats for fonts, their support by the respective browsers as well as the provision of free fonts. Furthermore, by now powerful frameworks are provided for Javascript which are even capable of replacing server-based software. Finally, UI frameworks are available to bring together all those functionalities and provide frequently used elements and functions/methods – as e.g. Bootstrap³ or Foundation⁴. UI frameworks significantly facilitate the development and maintenance of websites. All these aspects lead to standardization and, thus, increasing stability of digital scholarly editions – in spite of their differing designs.

³ getbootstrap.com.

⁴ foundation.zurb.com.

Digital scholarly editions are object to numerous requirements which are reflected accordingly by graphical user interfaces. The following part of this paper will concentrate on those requirements specific to digital scholarly editions of letters based on their characteristics and the presumed areas of their usage.

2.1 Faceted search

The designs of GUIs for digital scholarly editions of letters usually reflect the fact that letters are heterogeneous in their contents and are therefore used by researchers in a largely selective manner. For cases when the use of printed scholarly editions of letters involved the cumbersome dealing with indexes and letter lists, or manually skimming through the book, there are now graphical user interfaces supporting the exploitation of scholarly editions. Users of DSEs will not just be offered simple letter lists but will additionally be provided with functionality to dynamically filter data and create lists according to their individual interests. Here, the transition from providing a small amount of simple filters to an elaborate faceted search is continuous. In all these cases, the named functionalities allow users to automatically obtain indexes of letters relevant to them. In case such lists are accompanied by regesta of letters, users may probably be even more capable of deciding which letter might be relevant for a given research question. A good example for the potential of elaborate filtering functionalities are the correspondence indices of the *Carl-Maria-von-Weber-Gesamtausgabe* (WeGA, fig. 1) and the *ePistolarium* developed at the Royal Netherlands Academy of Arts and Sciences. Of course, the potential of modern web programming influences the design of these filters, meaning that certain filters may come with a design suitable exactly for their purpose as e.g. a slider to narrow down the filtered date range. Furthermore, filters may be designed to not only take a single value but to combine several different values for selecting content.

2.2 The index as a central starting point

Due to the selective usage of edited letters, a thoroughly prepared index was already considered crucial for printed scholarly editions of letters (Laufer 123; Le Guillou 200). With digital scholarly editing, indexes were acknowledged to be even more significant and, by now, often are the primary access point at the main page of a DSE of letters. Thus, traditional concepts for indexes shift once persons and places are presented as equally important as the letter index. One example is the DSE of Alfred Escher's letters where the indexes for persons, places etc. are prominently presented to the users via the main page together with the letter index.⁵ Furthermore, index entries in

⁵ Often their number is displayed at the same time. This gives the user a quick overview of the edition's scope, which can no longer be recognised in the digital medium in contrast to the thickness of the spine

Home Weber Register Suche Projekt Hilfe | Sonderband | De En

CARL MARIA VON WEBER
GESAMTAUSGABE

BRIEFE

Home > Register > Briefe [← Zurück](#)

5918 Suchergebnisse

« zurück 1 2 3 ... 591 592 weiter »

pro Seite 10 25 50

Filter

Chronologie

18. Juli 1762 17. Okt. 1806

18. Juli 1762 5. Mai 1765 20. Feb. 1768 18. Okt. 1806

☐ zeige undatierte Dokumente

☐ blende erschlossene Briefe aus

Absender

Alle

Empfänger

Alle

Schreibort

Alle

Empfangsort

Alle

August Wilhelm Meyer an unbekannt
Hildesheim, Sonntag, 18. Juli 1762
Incipit: Nachdem von einigen hiesigen Brüdern abgeredet worden
Zusammenfassung: wegen des in Hildesheim wohnhaften von Weber sei ausgemacht, daß er nicht zugelassen werden solle bis er die Braunschweiger Loge wieder besuchen dürfe
Kennung: A040004 (in Bearbeitung)

Gottfried Jacob Jänisch an unbekannt
Hamburg, Mittwoch, 24. November 1762
Incipit: –
Zusammenfassung: Schreiben des Großmeisters der Logen von Hamburg und Niedersachsen, Konstitutionspatent

Figure 1: Index of letters in the Carl-Maria-von-Weber-Gesamtausgabe.

DSEs are also important entry pages for users querying for persons, oeuvres, etc. via search engines.⁶

It is an interesting observation in this context that the index of subjects becomes more and more en vogue again. While discourses in editorial studies of the 1990s were rather critical towards this kind of index because many researchers considered the collection of *subject terms* as arbitrary (Jaeschke 44; Mücke 101), we currently witness a renaissance of the index of subjects. I suspect this is because the paradigms of the digital medium relaxed the perception of different ways of access. For today, it is more than usual that users of websites are provided with not only one, but several access points. Each user may choose one or the other access point according to his or her personal preferences or research goals. This development has already led to the general practise not to hide indexes in the background but to feature them on the main page, this way emphasizing their equivalence in significance to letter indices in the front section of a book.

or the number of volumes of printed editions.

⁶ For example, in *edition humboldt digital*, the index entries are the second most important entry pages.

The increasing number of indexes of subjects may be due to the intention to offer an additional resource which users may or may not utilize depending on their interests. Examples of indexes of subject terms can be found in *Ifflands Archiv*⁷ or in the DSE of Alfred Escher's letters where the index of subject terms is even directly included as a filter in the letter index.⁸ The transition from subject index to topical categories as for example provided by the *Darwin Correspondence Project*⁹ or the *edition humboldt digital*¹⁰ is continuous.

The process of optimization of a digital scholarly edition towards its selective usage is not limited to providing access to the letter but continues with the presentation of the individual letters, e.g. entities linked to the index are often listed again at the margin. If the user clicks on a name, its occurrences are highlighted in the text. Such functionality can be found e.g. in the DSE of *August Wilhelm Schlegel's Correspondence* or of the *WeGa*.

2.3 Integral presentation of the text

Around the 2000s, the idea not to note amendments of the text within the apparatus but to present them inline with the edited text circulated among the creators of scholarly editions of letters. Thus, for instance, it was discussed to present deletions by strikethrough directly inline. The edition guidelines for letters of musicians already proposed such presentation (Appel et al. 13–14). For German Studies, this method was demanded by Hans Zeller arguing that it would be cumbersome (“umständlich”) and the text would be atomized (“atomisiert”) by sending amendments to the apparatus (47). He explains that amendments by the author could be easier understood by the reader if they were presented inline than if they were kept in the apparatus according to the traditional method (Zeller 46). But above all, Zeller considered such extra-linguistic features as highly important for the recipient in the context of communication by letter (Zeller 37). He thus concludes:

Zusammenfassend darf man wohl feststellen, daß die herkömmliche Darstellung von Änderungen schwerer verständlich ist, weil sie im Apparat den Kontext nicht vorführt, darum auch den Zusammenhang von Änderungen untereinander verdeckt, daß sie umständlich ist und Texteingriffe und Erläuterungen nötig macht und im ganzen wesentlich mehr Platz beansprucht. (Zeller 48)

⁷ iffland.bbaw.de/register/sachen/index.xql.

⁸ www.briefedition.alfred-escher.ch/briefe.

⁹ www.darwinproject.ac.uk/commentary/geology.

¹⁰ edition-humboldt.de/themen/index.xql.

To sum up, it may be stated that the traditional presentation of amendments is more difficult to comprehend because it is not included in the direct context and thus obscures the connection between the amendments, that it is cumbersome, leads to the necessity of changes to the text, explanations, and, after all, much more space.

Zeller provided an example for his suggestions in his scholarly edition of *C. F. Meyer's Correspondence* (Lukas and Zeller). While his proposal was indeed agreed with, many scholarly editions of letters still applied the traditional method. In the edition of *Goethe's letters*, for example, the text variants were moved from the commentary volume to the text volume, but still displayed as footnotes (Richter, "Probleme" 59).

With the advent of genuinely digital methods in the stricter sense, scholarly editing in principle followed Zeller's approach, because the encoding of the transcription has generally been carried out with the help of the mark-up language XML and according to the Guidelines of the Text Encoding Initiative. In these guidelines, the author's additions to and edits of the text are usually encoded not as footnotes, but semantically and inline in the text. Thus, the edited texts are already modelled in a way that displaying text edits inline is the obvious method. Such presentation is therefore realized in many DSEs of letters – facilitated by the extensive design options of web interfaces which exceed the capabilities of printed editions by far. For example, the text or its background can be highlighted in color; additionally, a tooltip can be provided for the user to communicate more information about the nature of a text edit. This way, the graphical user interface enables users to interact with the edited letter. The GUI ensures that the readers of a DSE can both keep track of everything and retrieve detailed information when required.

At this point, of course, we have to outline that a DSE can also offer different presentation types of the same encoded text. For example, it is possible to provide a view of the critically edited text including all text edits by the author and the editor. At the same time, it is also possible to display a reading text to facilitate reception as well as citation of the edited text. Thus, the DSE can address scientific experts as well as students with the same encoded text. It is not necessary anymore to decide on one of these target groups, as it was the case in the Gutenberg era (Richter, "Probleme" 59).

2.4 Materiality

Besides access and search options, the DSE even highly enhances the presentation of the material aspects of a letter. This is because a DSE can provide digital facsimiles of the edited letter without great effort. Examples are *Briefe und Texte aus dem intellektuellen Berlin um 1800* or *Vincent van Gogh. The Letters*. Thus, at a glance the user can view the paper used, the handwriting, and the layout on the letterhead etc. Therefore, providing digital facsimiles is regarded as de facto standard today and is usually realized in DSEs of letters. The facsimile is often presented in a synoptic view,

thus allowing the user to check the transcription easily against its facsimile. For this purpose, it is quite common to even encode the original line breaks and show them in the edited text (perhaps just as an option). In rare cases, the lines in the image are linked with their counterpart in the transcription. If the user moves the cursor to a line in the image, the transcribed text is highlighted or displayed. Such a feature was, for example, implemented in the *Digitale Briefedition Alfred Escher*. This is a smart feature, though its necessity depends on the usage scenarios intended with the edition. The argument frequently put forward by editors of this feature being a reading aid should be used cautiously. Despite the premise of verifiability, the edited text, which has been acquired over many years of meticulous work, should not be underestimated. Users will usually consult an edition because they do *not* want to deal with the facsimile in the first place. The facsimile should therefore be regarded as a carrier of additional information and not as a substitute for the edited text.

2.5 Commentary

The identification of mentioned persons, places, publications, etc. is one of the most important parts of the commentary of a DSE of letters. In printed editions, the commentary was given as footnotes below the text; additionally, the respective passage was noted in the index. However, even back then, editors regarded the index as an opportunity to relieve the commentary (Wenig 116; Hagen 216): firstly, additional information about persons was added to the index entry, not to the single commentary (Hagen); secondly, persons often mentioned in the text were indexed also under their names used in the letters. Thus, a comment was not always necessary. Today, the DSEs of letters pick up this procedure when they just link names and pronouns to the index entry. An individual comment is not necessary anymore (Steierwald et al. 232). This underlines again that the digital medium highly exceeds the capabilities of a printed edition. The DSE can not only simulate a printed footnote, but also even exceed it by using a so-called pop-up, which can be displayed right at the text passage by clicking on a link. The data displayed in the pop-up is usually retrieved from the index (of persons, places etc.), which is normally maintained at one central place, so that these “comments” can be easily updated if necessary. A good example for such a digital “footnote” is implemented in the *Carl-Maria-von-Weber-Gesamtausgabe*: in its pop-ups the WeGA not only shows the full name as well as the dates of birth and death, but also further information like occupation and area of activity of a person. If desired, the user can jump to the index entry to obtain detailed information and links to other edited texts in the DSE. Besides these improvements, the actual commentary still remains existent and is recorded as coherent text as it was the case in the Gutenberg era.

2.6 Correspondence context

The digital scholarly edition of letters also pays more attention to the correspondence context, i.e. the position of a letter in a correspondence between two correspondents or the position in the whole correspondence of *one* person. Printed scholarly editions could always display just one of them sufficiently well. Either it was an edition of a specific correspondence between two people – then the reader lost the context of other correspondences of an author –, or it was a complete edition of the whole correspondence of a person – then it was difficult for the reader to obtain an overview of the preceding or following letter in a specific correspondence. For that purpose, indexes of letters were provided, but they were limited to the volume at hand. This problem can be addressed very well in DSEs of letters. Firstly, the DSE can provide an overview of the whole correspondence considering all correspondents at the same time, or it can limit this overview to a certain correspondent or time span. Moreover, the context of an entire correspondence – not only the following or preceding letter – can be displayed within a single letter, including the position of the currently opened letter in the “dialogue”. Such features are implemented in the *Digitale Briefedition Alfred Escher* in an outstanding way (cf. fig. 2). This DSE offers a visual overview of the (preserved or conjectured) correspondence and highlights the currently selected letter. The letters are represented by circles per year, which become larger if multiple letters exist for a certain year. By clicking on a circle, the basic data of the letters can be displayed. This way, gaps in the preserved correspondence can be recognized immediately (the user has to investigate, of course, why these gaps exist). Furthermore, the user can easily browse through the whole correspondence of Alfred Escher or through the current specific correspondence.

3 Beyond the edition

3.1 Reusing edited letters

Complete editions of the correspondence of a single person are not very often carried out, due to the huge effort involved. Even for persons who are regarded most important by scientific research, complete editions are not always available or in progress. Especially for persons who wrote and received many letters, a complete edition was often considered not feasible. This is the case, for example, for Alexander von Humboldt, Johann Wolfgang von Goethe, or August Wilhelm Schlegel. Instead of attempting to create a complete edition, single correspondences between two partners – and even single letters – were edited and published in these cases (Humboldt and Schlegel). In the case of Goethe, the letters written by himself were edited, while the letters addressed to him were not – they were recorded as regesta.

The screenshot displays the 'Digitale Briefedition Alfred Escher' interface. At the top, the Alfred Escher Stiftung logo is visible. Below the navigation bar, the breadcrumb trail reads 'Home > Briefe > B0136'. A timeline visualization shows the correspondence between Alfred Escher and Johann Jakob Tschudi from 1820 to 1880, with a specific point highlighted for the letter in question. The main content area features the title 'Johann Jakob Tschudi an Alfred Escher, s.l., Donnerstag, 20. April 1837' and a list of keywords: 'Freundschaften, Turnen und Sport, Turnfeste'. Below this, a section titled 'Briefe' contains a list of document types: 'Edierter Text', 'Diplomatischer Text und Bild', 'Bild und diplomatischer Text', and 'Digitalisat'. The transcribed text of the letter is shown, followed by a 'Kontexte' section with checkboxes for 'Markierungen eingeblendet', 'Personen', 'Escher Heinrich', and 'Escher-Zollikofer Lydia'. The letter text itself discusses a misunderstanding about a turnfest and a letter from Escher's brother.

ALFRED ESCHER
STIFTUNG
Briefedition

Briefe Kontexte Suche Über die Edition Benutzerkonto

Home > Briefe > B0136

< Vorausgehender Brief der Gesamtkorrespondenz Nachfolgender Brief der Gesamtkorrespondenz >

< Vorausgehender Brief Korrespondenz: Alfred Escher – Johann Jakob Tschudi Nachfolgender Brief >

1820 1830 1840 1850 1860 1870 1880 o. J.

AES B0136 | CH-BAR#j1.67#1000/1363#507*

Johann Jakob Tschudi an Alfred Escher, s.l., Donnerstag, 20. April 1837

Schlagwörter: Freundschaften, Turnen und Sport, Turnfeste

Briefe

Edierter Text Diplomatischer Text und Bild Bild und diplomatischer Text Digitalisat

Ich will keinen Augenblick zögern, mein Freund, Dir auf deinen heute erhaltenen Brief zu antworten, da er einen Gegenstand enthält, der mich nicht ruhen läßt bis eine offene Erklärung zeigt, wie sehr du durch frühzeitigen Verdacht verleitet, mir Unrecht gethan hast. Mein Bruder schrieb mir unterm 8^{ten} März folgendes was ich wörtlich aus seinem Briefe copiere: Wenn dein Freund Escher ans Turnfest kommt, so kann er bei mir logieren, sonst werde ich einen Quatiermeister in mein Logis nehmen. Darauf schrieb ich ihm zurück als P. S meines Briefes: Bis jetzt weiß ich noch nicht mit Gewißheit ob Escher ans Turnfest kömmt, da er gegenwärtig unwohl ist, sicherer wäre es, wenn du den Quatiermeister für dein Logis nehmen würdest, da vielleicht E. bei Hr. von Meienburgs logieren muß. – Ob diese Worte, die nämlichen meines Briefes sind, kann ich nicht verbürgen, eines oder das andre mag anders gestellt gewesen sein, mit meinem Ehrenworte kann ich dich aber versichern, daß der Sinn derselben, durchaus der nämliche war. Bei der Anwesenheit meines Bruders in Zürich wurde dieses Gegenstandes durchaus keiner Erwähnung mehr gethan. –

Diese offene Erklärung genügt hoffentlich um deinen Verdacht von mir zu wälzen, wäre sie nicht

Kontexte

Korrespondenten
Johann Jakob Tschudi
Alfred Escher

Briefdatum
20. April 1837

☒ Markierungen eingeblendet

☐ Personen
☐ Escher Heinrich
☐ Escher-Zollikofer Lydia

Figure 2: The *Digitale Briefedition Alfred Escher* displays the correspondence context above the transcribed letter.

If a complete edition does not seem feasible, the question arises how to open up the whole correspondence to research despite their dispersed publication. This question was particularly relevant for researchers interested in the German author Hugo von Hofmannsthal in the 1970s and 1980s. A complete edition did not exist and did not seem viable, as a large number of his correspondence had already been published. In this situation, Günther Fetzter proposed the idea of a “Mixed Scholarly Edition” (Fetzter, *Briefwerk* 37–40). In such a “Mixed Scholarly Edition”, the editor should decide for each single letter individually: if it was to be edited completely, just provided as part of the regesta, or even only as a metadata record of an existing edition or archival source. Criteria for a decision should be the situation of the archival or printed preservation,

its accessibility and the importance of the letter. With the idea of a “Mixed Scholarly Edition”, Fetzer wanted to propose a concept by which a large correspondence could be made accessible to research in an efficient way. An interesting aspect was that the “Mixed Scholarly Edition” could build on already published editions and, therefore, would not have to edit published letters again. Fetzer’s concept of a “Mixed Scholarly Edition” was mainly criticised and hence not pursued any further (Scheibe 80–81). Thus, the letters of Hugo von Hofmannsthal were published as regesta in 2003 instead of the proposed “Mixed Scholarly Edition”.

In the digital era, Fetzer’s idea does not seem to redeem itself but to be picked up in another way. There are multiple projects in which older publications and editions of letters are retrodigitized and included in the DSE. One example is the *Digitale Edition der Korrespondenz August Wilhelm Schlegels* which has been funded by the German Research Foundation since 2012. In this DSE, all letters from and to A. W. Schlegel are united, be they already edited or not. For those letters which were already published in a printed edition (ca. 2500 of 5000 letters), the printed text is digitized and made accessible online. These editions are not checked or updated, but supplemented by a scan of the print as well as a scan of the manuscript, if available. Furthermore, metadata is recorded for each letter, including the mentioned persons, places etc., to enable extensive searches on the material. Such an integration of already edited letters would not have been possible in the printing age. The graphical user interface can present accurately to the user the former edition as well as offer search and query options within the framework of the new edition.

3.2 Correspondence networks

Besides the traditional correspondence context described above, the graphical user interface of a DSE of letters generally offers the possibility to display even the extended correspondence context: one letter and its author are not only part of the “dialogue” between two correspondents, but also of a larger correspondence network as both correspondents do not just write letters to each other but also to other people. In an edition of a specific correspondence, we do not see the other contact persons of the correspondents; in a complete edition, we see only the other letters of the author the edition is dedicated to, but not of his correspondence partners. The effort to present even only the basic metadata of these “missing” letters seems to exceed the capabilities of a single project by far. How should an edition project such as, for example, the complete edition of the works by the German theologian Friedrich Schleiermacher, research and gather the correspondence of his partners? From the point of view of project execution, this would be impossible. However, in the digital era, this could possibly be done with the help of technical interfaces. The specific characteristics of

the text type “letter”, the idea of correspondence networks, and the selective usage of scholarly editions of letters suggest that scholarly editions of letters cannot be considered as self-contained. There are too many connections to other scholarly editions or external content: via the letters themselves or via the mentioning of so many different persons, publications, events etc.

With the rise of digital methods in the field of scholarly editing in the 1980s and 1990s, scholars also thought of databases of letters which connect different entities with each other (Fetzer, “Elektronisches Edieren” 113; Bagaturija 337). However, these databases often remained only wishful thinking and were rarely realized in research projects – usually in projects conceptualized as a complete edition and well-staffed. Prominent examples are the databases of the Melanchthon correspondence, of the Haller correspondence, or of the Goethe repertory. In spite of these databases, the scholarly editions themselves were obviously published as a printed book. The data stored in the databases usually just covered the metadata of the correspondence and included references to archival or printed material. In many cases, these databases were not available online but only installed on individual computers in a research centre.¹¹

Despite the large data quantities and the many possibilities which were provided by these databases, scholars knew their limitations: the databases were created with regard to a specific person and indeed mapped their correspondence network. But they did not allow for analyses on larger correspondence networks uniting letters and correspondents from different scholarly editions. In the field of the “Republic of Letters”, this problem was recently addressed with the database *Early Modern Letters Online*, which was designed to record metadata for all letters from the early modern period. For the Romantic era or the political and scientific correspondence networks of the 19th century, scholars estimate such a single, centrally organized project as not feasible. The amount of letters preserved in archives or printed editions which would have to be searched and recorded is too huge (Bunzel 117). It seemed utopian that one single project could realize this, especially if it should not only record the metadata, but also provide a scholarly edition for all letters. For example, projects for complete editions of important persons of the 19th century have been in progress for a couple of decades already and will still need a lot of time to fulfil their goals. For these reasons, scholars proposed a different approach in which the data would be aggregated from many different single projects. A practicable way to realize this in digital scholarly editions of letters are application programming interfaces.

¹¹ As it was the case for the correspondence of Albrecht von Haller. Only since 2016 a new, online available database is in progress. See www.hist.unibe.ch/forschung/forschungsprojekte/haller_online/index_ger.html.

4 Application programming interfaces

4.1 BEACON

Among the first APIs provided with these considerations in mind is BEACON. Actually, BEACON is an interchange format to provide a large number of uniform links. The format has been used for several years already in German speaking countries to connect index entries and information about persons in DSEs and other digital resources. The links consist of unique IDs from the German authority file *Gemeinsame Normdatei* (GND), which is provided and maintained by the German National Library as well as by German and Austrian library networks. IDs are necessary here because names could be ambiguous, on the one hand (e.g. “John Smith”), or refer to the same person whilst being written differently, on the other hand. It would be difficult and prone to errors if names were to be processed for linking.

If available for a person, the ID from the GND should be recorded in the index entry of that person in a DSE (in addition to a project-internal identifier for this person). All GND-IDs then have to be provided online under a public URL in a simple text file according to the BEACON format. Another DSE can now retrieve these files and match them with their own index entries. The only requirement is that GND-IDs are provided for every person recorded (if available). With the help of these IDs from the authority file and the BEACON format, index entries from different DSEs can be linked automatically (Stadler, “Normdateien”).

The process of enriching the index entries as well as the technical implementation of the interface is so simple that smaller DSEs can provide a BEACON interface as well. Hence, BEACON has become quite established as a standard interface in DSEs created in German speaking countries. In the international context, this interface is less common, although IDs from different authority files can be mapped with the help of the *Virtual International Authority File* (VIAF).

In the meantime, it is possible to identify not only persons, but also organisations, places, and other entities with the help of authority files. Furthermore, the automatic linking on BEACON is not only restricted to DSEs but can cover all sorts of online resources, e.g. archival union catalogues like *Kalliope* or encyclopedic dictionaries like the *Deutsche Biographie*. The latter is a good example for a central hub connecting different scholarly digital resources with the help of a BEACON interface.

The BEACON format and the usage of IDs from authority files also illustrate the change from printed editions to digital editions: persons, places, works etc. are considered entities rather than names. Information about these entities exists in different DSEs and other digital resources. This is why their aggregation seems desirable. A precondition for this would be that this information is modelled and provided in standardized formats to enable their interchange with other DSEs or web

services like the *Person Data Repository* (PDR), which was developed some years ago at the Berlin-Brandenburg Academy of Sciences and Humanities. With *prosopogrAPhi*, a working group around Georg Vogeler proposed a different approach which still has draft status. Overall, the need for interchanging data about historical persons seems evident, but it seems – at least at the moment – that a solution which is recognized by the major part of the scientific community is still missing.

4.2 Correspondence Metadata Interchange Format (CMIF)

The linking of index entries is a very basic way of connecting DSEs of letters among one another. It seems more interesting to connect DSEs of letters by their actual core material – the letters. Only this level of cross-linking would allow the analysis of networks, discourses etc. based on correspondence.

For this purpose, in 2014, the TEI Correspondence Special Interest Group (SIG) initiated the development of an interchange format for correspondence metadata. Reason and starting point for this development was the implementation of the element `correspDesc` (correspondence description) in the TEI Guidelines in April 2015, which enables scholars to encode the correspondence metadata of a letter, a postcard, etc. in a DSE. Besides this main intended use, a further goal was to enable the interchange of correspondence metadata (Stadler et al.; Stadler, “Interoperabilität von Digitalen Briefeditionen”). Therefore, the SIG has developed the *Correspondence Metadata Interchange Format* (CMIF), based on the element `correspDesc` and the TEI Guidelines. With the help of the CMIF, scholars can now provide the correspondence metadata of a scholarly edition of letters as a whole in a machine-readable way. In the CMIF, the correspondence description is used for each letter in a DSE, but with more restrictions than the TEI Guidelines would normally specify. This is to ensure machine-readability and real automatic interchange. For the same reason, persons and places are identified by IDs from authority files – comparable to the BEACON format.

The correspondence metadata, encoded in the CMI format, has to be provided online. From there, other DSEs or aggregating web services can retrieve, process, and use the metadata. One example of such a web service is *correspSearch*¹², which was provided in a first basic version in 2014 and which has been further developed since autumn 2017 in a project, funded by the German Research Foundation. The web service *correspSearch* aggregates the metadata provided by different scholarly editions and displays them via a graphical user interface for a centralized search as well as via an API for automated queries and further use (Dumont). By providing an API, *correspSearch* enables scholars to apply further methods on the aggregated metadata, for example with tools for network analysis. Furthermore, the API allows

¹² Available under: correspsearch.net.

edition humboldt digital Reisetagebücher Themen Briefe Chronologie Register ⓘ 🔍

◀ Briefe im Jahr 1795 ▶ Themenschwerpunkt: Biowissenschaft Briefnetz erkunden ▶

◀ Korrespondenz mit Samuel Thomas von Soemmerring ▶

Alexander von Humboldt an Samuel Thomas von Soemmerring, Bayreuth, 7. Juni 1795

H: Freies Deutsches Hochstift / Frankfurter Goethe-Museum, Frankfurt am Main, Handschriftensammlung, Hs-5053

Kritischer Text Lesetext Text mit Faksimile

Verehrungswerther Freund,

1r | Ich will Ihnen ein Buch dediciren, ich ein physiologisches; es soll bald gedruckt werden u Sie haben es noch nicht erlaubt..... Das ist eine sonderbare Dreistigkeit. Aber als Ueberraschung wage ich es nicht u die Erlaubniß müssen Sie mir nun schon geben. Könnte ich Sie doch mündlich darum bitten. Aber ein böser Dämon hat uns getrennt gehalten. Ich war den Sommer 94 meist bei der Armee, beim Feldmarschall und Hardenberg. Ich war einige Mal auf einige Stunden in Mainz suchte Sie in Ihrem Hause,

Briefe von oder an Alexander von Humboldt im selben Zeitraum in anderen Editionen:
Von **Alexander von Humboldt an Christoph Girtanner**, Jena, 16.04.1795
Alle Nachweise in [correspSearch](#) ansehen

Briefe von oder an Soemmerring im selben Zeitraum in anderen Editionen:
Von **Georg Christoph Lichtenberg an Soemmerring**, Samuel Thomas, Göttingen, 05.06.1795
Von **Friedrich Heinrich Jacobi an Soemmerring**, Samuel Thomas, Wandsbeck, 13.06.1795
Alle Nachweise in [correspSearch](#) ansehen

Diese Verknüpfungen werden automatisiert bereitgestellt über [correspSearch](#).

Figure 3: “Briefnetz erkunden” – “Explore Correspondence Net” (right top corner) for a letter in *edition humboldt digital*. The feature is realized with the help of the aggregated data and API in *correspSearch*.¹⁴

for direct and automated cross-linking between different DSE of letters. One example of such linking feature was implemented in *edition humboldt digital*: first, the API is queried when a user accesses a letter in the DSE. At that moment, the DSE asks for letters which were sent or received by the respective correspondent in the same time but are edited in *other* scholarly editions (see fig. 3). Then, the aggregated data from *correspSearch* is used to display the letters provided in *edition humboldt digital* in the context of Humboldt’s whole (printed) correspondence, which is published sparsely in different scholarly editions. For this purpose, the metadata from *correspSearch* can be displayed via the index of letters as well as in the chronology of Humboldt’s life.¹³

4.3 OAI-PMH

The Open Archive Initiative (OAI) has developed the *Protocol for Metadata Harvesting* (PMH) to enable repositories and document servers to share metadata about stored texts and media in a standardized way (Lagoze). These metadata can be harvested by different web services and used for centralized searches. OAI-PMH only defines the area of technology which is used, the context format (XML) and the query parameters –

¹³ edition-humboldt.de/chronologie/index.xql?jahr=1805&briefe=on&cs=on.

the respective metadata format used can be chosen by the project itself. The minimum requirement of OAI-PMH is that metadata is offered in the *Dublin Core* (DC) format, which is not very complex and only covers about a dozen fields. Thus, on the one hand, DC facilitates providing an OAI-PMH interface because data providers do not have to get familiar with a complex format. On the other hand, it limits the scope of application of the format. For example, in a DSE of letters it is not possible to differentiate between sender and receiver (and their respective places and dates). Therefore, for DSE of letters, DC is less powerful than CMIF. Nevertheless, it is useful for DSEs to provide this interface as well because a couple of search engines, such as the *Bielefeld Academic Search Engine* (BASE), support this format. This way, letters can also be indexed by them.¹⁵

4.4 TEI-XML

Besides the metadata, the DSE can provide the complete texts plus their annotation as TEI-XML. In many cases, DSEs provide a download link or display the TEI-XML in a synoptic view. This is useful for those users who are interested in single letters or just want to check the encoding. However, if someone is interested in the whole corpus or a large part of it, this is not feasible anymore. At least a ZIP package including all texts should be provided, though the provision of an API, where the data can be retrieved automatically, is even better. However, a standard interface to provide TEI-XML data is not yet available. One reason could be that scholarly editions are still mostly hesitating to publish their full TEI-XML data. If it is offered, then only by the end of a project. One outstanding example is the *Carl-Maria-von-Weber-Gesamtausgabe* which offers all edited texts as TEI-XML from the beginning. For this, the *WeGA* provides an API.¹⁶ In the absence of standards, this API is specific for the *WeGA*, but the specification is documented with the help of a standardized OpenAPI Specification. This approach not only facilitates the use of the API, but also allows retrieving information about the API automatically. The *WeGA* also provides content negotiation for its resources. This means that a user as well as an application can retrieve the same resource automatically as HTML as well as XML – just by adding the file suffix .html or .xml to the URI. Perhaps such a feature will become more important in the future, when Semantic Web technologies are used more frequently in DSEs.¹⁷ With the help of content negotiation, it will be possible to provide the information

¹⁵ This is the case for letters (as well as diaries and other manuscripts) in *edition humboldt digital*: www.base-search.net/Search/Results?q=dccoll:fteditionhumboldt&refid=dcrecde.

¹⁶ weber-gesamtausgabe.de/de/Hilfe/API_Dokumentation.html.

¹⁷ In the Semantic Web, the goal is that all information in the web is given well defined meaning and the information is stored in a machine-readable way as graphs. See Schrade for an overview of DSEs of Letters in the Semantic Web.

“beyond” the URI not only to human users but to other programmes, websites and web services as well.

An API which delivers the edited texts in TEI-XML is more than desirable nowadays. The transcription and annotation of texts costs much time and effort – only if the source TEI-XML data is provided, other research projects can benefit from that work. Thus, use cases become possible which were inconceivable in the Gutenberg era: edited letters can be, for example, used in linguistic corpora by research projects in Historical Linguistics. One example of how the further linguistic reuse of edited texts in linguistic corpora can be assured with the appropriate workflow is the project *Travelling Humboldt – Science on the Move* at the Berlin-Brandenburg Academy of Sciences and Humanities. Here, the texts are encoded according to the *Base Format* (DTABf) of the *Deutsches Textarchiv* (DTA) – with only a small amount of projects-specific variance. After having been published in the *edition humboldt digital*, these texts are provided via a TEI-XML-API. This way, Humboldt’s texts can be imported right away in the *DTA* where they become part of the reference corpus for the New High German language.

An important aspect in this case is the usage of the *DTA*’s *Base format*. The DTABf has been developed since 2007 by the *DTA* and in the context of *CLARIN-D*¹⁸. It is a pure subset of the TEI Guidelines, i.e. there were no new elements or attributes added, but the TEI tag set was substantially reduced and restricted. Furthermore, standardized values for multiple attributes were provided. Thus, on the one hand, the DTABf limits the possibilities of encoding. On the other hand, it enables the automatic interchange of TEI-XML documents without manual intervention. Otherwise, manual conversions would be necessary to integrate edited texts in the *DTA* (Haaf et al.) – if possible at all, for DTABf is currently the only uniform encoding standard leading to the unambiguous encoding of edited texts in TEI. The usage of TEI-XML alone could not ensure this, neither could it enable full automatic interchange (Stadler, “Interoperabilität” 280; Bauman).

Besides an encoding which is at least compatible to TEI-XML, another precondition must be met to allow the linguistic reuse of data from a DSE: the texts have to be transcribed as closely to the text source as possible. The best digital workflow is worth nothing if the text is normalized. Thus, the diplomatic edition developed in the past decades and literal transcription is now more important than ever.

4.5 COinS

Besides persons and places, there are also often publications mentioned in the text or commentary and, therefore, listed in a particular index. These publication indexes or

¹⁸ www.clarin-d.net/en.

bibliographies in DSEs should be recorded and handled as data as well. If bibliographic data is carefully modelled, it is possible to provide the literature references in different export formats so that users can retrieve and automatically store them in their own reference management software. A common way to provide machine-readable bibliographic data is *Context Objects in Spans* (COinS). By using COinS, the separated information about a publication are stored according to the OpenURL standard as key/encoded value in the title attribute of the HTML element ``.

```
<span class="Z3988"
title="url_ver=Z39.88-2004&ctx_ver=Z39.88-2004&rft_id=info%3Aid%2Fzotero.org%3A2
&rft_val_fmt=info%3Aofi%2Ffmt%3Akev%3Amtx%3Abook&rft.genre=book&rft.btitle=
Vom%20Baue%20des%20menschlichen%20K%C3%B6rpers&rft.place=Frankfurt%2FMain&
rft.publisher=Varrentrapp%20und%20Wenner&rft.aufirst=Samuel%20Thomas%20von&
rft.aulast=Soemmerring&rft.au=Samuel%20Thomas%20von%20Soemmerring&rft.date
=1791"></span>
```

This format is supported by many reference management software tools, such as *Mendeley*, *Citavi* or *Zotero*. Bibliographic data encoded in such a way can be imported by users with just one click into these programmes. Furthermore, it is possible to automatically search for copies in libraries with the help of web services which support Open URL. Such a web service is provided, for example, by the *OCLC WorldCat*.

Numerous library catalogues and websites offer their bibliographic data as COinS, for example the online catalogue of the Library of Congress or the German National Library. In the field of DSEs, this API is provided, for instance, in the *edition humboldt digital*.¹⁹

In principle, the format can be produced based on any metadata format. However, those who want to save the effort can use the reference management software *Zotero* and store all bibliographic data there. With the help of *Zotero Groups* and the *Zotero API*, it is possible to retrieve the publication data in different machine-readable formats (such as COinS, RIS or BibTeX) as well as readily formatted HTML according to a chosen (or even created) citation style. Furthermore, all data can be searched via the API. By using *Zotero* as a web service, those functions do not have to be individually developed and provided in the individual DSE.

4.6 Challenges

On the one hand, providing APIs in DSEs of letters solves some scholarly problems from the Gutenberg era, on the other hand, new challenges arise for edition projects.

Firstly, there are legal problems. Not everything that is technically possible is necessarily lawful. A machine-based usage is technically possible, but might not happen because of legal uncertainty for the reusers. For this reason, material provided via an API should be clearly licensed with a free license. To facilitate the subsequent

¹⁹ E.g. edition-humboldt.de/register/literatur/detail.xql?id=6WKSXFU3.

use of edited texts, edition projects should not create their own terms of usage, but apply standard licensing agreements like those provided by *Creative Commons*. The edited texts could be licensed under the terms of the *Creative Commons Attribution-ShareAlike 4.0 International* (CC-BY-SA). For metadata, one could go a step further and license it as *Public Domain* or *CC0*. This facilitates a) the reuse of metadata in larger contexts; and b) lead new users to the edition. Edition projects often provide metadata for the purpose of leading users to the DSE – and this is much easier if the metadata can be reused with a minimum of requirements.

Secondly, edition projects have to consider which API(s) they are able to provide. The APIs BEACON and CMIF are significantly easier to implement because, in the end, they consist in a text or XML file which has to be retrievable via a certain URL. These APIs are static, i.e. they do not have to respond to different parameters in the URL that provide different outputs. In contrast, that is the case for an OAI-PMH-API. For that reason, not every DSE of letters can provide such an API – it is limited by the project's schedule and the staff resources available. Then again, other APIs or metadata formats can be offered with the help of third party's programmes or web services. For example, by using *Zotero* to create and maintain the bibliography, edition projects can rely on the *Zotero API* to provide different export formats and citation styles.

Thirdly, the problem is how to handle data from external sources, programmes or web services in the DSE. In practice, external data usually has to be cached in the DSE, i.e. there has to exist a copy of the – necessary – data. This is required for performance reasons, since real time queries often take too long as users will have to wait for the rendering of a web page. Furthermore, without caching the external data, certain functions would be not available if the third party web services are temporarily or permanently offline. The effort to provide these data as a copy is smaller or larger depending on the data format, the data quantity, and the used technologies.

5 Conclusion

Despite the problems mentioned here, it has to be stated that the digital scholarly edition can fulfil the requirements to represent the characteristics of correspondences much better than the printed edition could ever do. The graphical user interface allows users better access to and easier handling of the edited texts. Additionally, the GUI as well as the API today enables comprehensive linking between the DSEs of letters – a feature requested already in the Gutenberg era, but impossible to implement at the time. Especially the analysis of correspondence networks is possible now because the edited texts are modelled as data and shared via APIs under free licenses. Thus, users are now enabled to conduct their own, additional research on the material or

reuse them for their own scholarly edition. Here, the shift from a “reader” to a “user” becomes apparent.

However, the development of DSEs of letters is by no means finished. Further standards and best practices for GUIs and APIs will have to be developed. The next step probably is the application of technologies from the Semantic Web, the usage of which in DSEs of letters is still in its infancy.

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Between Innovation and Conservation: The Narrow Path of User Interface Design for Digital Scholarly Editions

Chiara Di Pietro and Roberto Rosselli Del Turco

Abstract

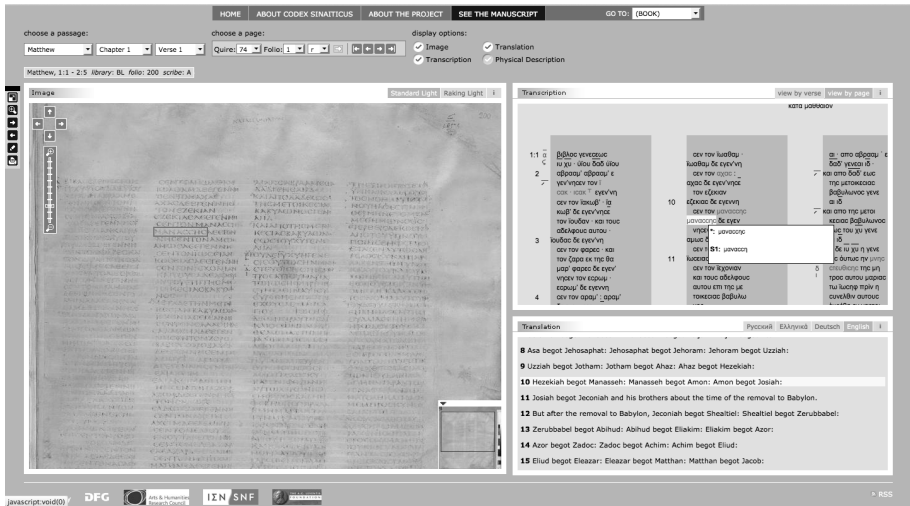
In 2016, the Edition Visualization Technology (EVT: evt.labcd.unipi.it/) team started the design phase necessary for the development of the next version of this tool aimed at easy publishing of TEI XML-based digital editions: the current version (EVT 1.2), in fact, only supports diplomatic transcriptions linked to the corresponding manuscript images; EVT 2.0 will fully support critical editions encoded according to the TEI parallel segmentation method. To reach this goal, a completely new approach based on the AngularJS framework and the MVC (Model View Controller) architectural pattern was necessary because the old architecture, relying on XSLT 2.0 transformations, was no longer flexible enough to meet all the UI and navigation requirements of critical editions. Furthermore, during the design phase we decided that in some cases keeping a layout inspired by traditional printed editions would be a great help for our final users. After a long but interesting development process, a beta version of EVT 2 is out: we believe that the UI layout and solutions we devised are both effective in the short term, for all the projects that will adopt EVT, and a significant contribution to the theoretical discussion revolving around the very concept of DSE.

1 Introduction

When the first critical editions appeared in digital form as digital scholarly editions (DSE), they adopted the traditional printed editions model: the layout was typically based on multiple rectangular text frames arranged in a single HTML page within which all edition data – the main text, the critical apparatus, possibly textual notes, glossaries, etc. – would find its place in a very ordered manner.

One example of this approach can be seen in the *Codex Sinaiticus Project*,¹ where the global User Interface is organized in three different frames, one for the image, one

¹ The *Codex Sinaiticus Project* (codexsinaiticus.org/) is an international collaboration born with the goal of creating a digital edition of this 4th century manuscript, containing the Christian bible in Greek, in order to make it accessible to the general public.

Figure 1: *Codex Sinaiticus Project*.

for the transcription and one for additional content such as a translation of the edited text (fig. 1).

Another important example is the critical electronic edition of Wolfram von Eschenbach's *Parzival* (*Parzival Project*),² where the content (critical edition text, base transcription text, images and witnesses text) is arranged in fixed frames of equal size (fig. 2).

This approach, which is still used in some recent editions, has been criticized because while it allows the user to take advantage of hypertext capabilities in a Web- or HTML-based edition, it is based on a 'slavish' reproduction of printed editions. This, in turn, leads to a somewhat inflexible layout which results in unacceptable limitations with regard to the methods of presenting and querying the textual material. The "printed page paradigm" (see Sahle *Digitale Editionsformen* 270; Sahle "What Is a Scholarly Digital Edition?" 26–27) heavily influences the first specimens of digital editions:

Most digital editions are only timidly engaging with the medium, trying to reproduce on the screen the same experience offered by the printed page,

² The *Parzival Project* is a project funded by the Swiss National Science Foundation (SNF) and the German Research Council (DFG) with the primary aim of creating a critical electronic edition based on four witnesses of the *Parzival*, one of the greatest medieval poems attributed to the German poet Wolfram von Eschenbach.

Kritischer Text: Parzival 1.15 – 1.25

Übersetzung >>

- 1.15. diz vliegende bîspel
 1.16. ist tumben liuten gar ze snel;
 1.17. sine mugsen niht erdenken,
 1.18. wand ez kan vor in wenken
 1.19. rehte alsam ein schellec hase.
 1.20. zin anderhalb an dem glase
 1.21. gelîchet und des blinden troum,

Hs. D: 'gelîchent'

D m n o G [I] L M O Q [R] T U V [V] W Z Fr32 Fr58

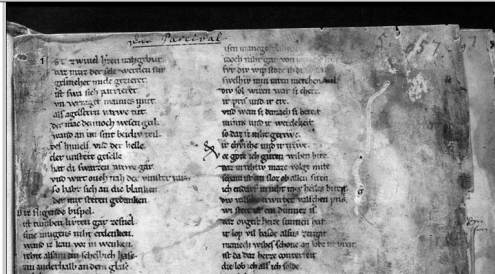
Variantenapparat: Parzival 1.15 – 1.25

- 1.15.
 1.15 nach 1.18-r: Q
 diz] Daz Z Fr58, Diz D T, Diz Fr32, Djs m
 vliegende] vli*gende vs gende M, flende Q, fligenden Z

- 1.16.
 tumben] tûmbe U
 gar] om. U
 ze] om. m W
 soell] soelle m

TextzeugenHs. D:
St. Gallen, Stiftsbibliothek, Cod. 857

- D S. 5a
 D 1.15. Diz fligende bîspel.
 D 1.16. ist tumben liuten gâr zesnel
 D 1.17. sine mugsen niht erdenken.
 D 1.18. wand iz kan vor in wenken.
 D 1.19. rehte alsam ein schelbich hase.

Figure 2: *Parzival Project*.

desperately trying to demonstrate that digital editions are as good as printed ones. (Pierazzo *DSE* 2–3)

Which is why, starting from a certain moment onwards, digital editors have strayed from this model to explore new concepts and new forms of User Interfaces applied to DSEs. This has led to the introduction and use of a new layout, new graphical widgets, new navigation methods, etc.

One consequence of this search for more effective approaches, however, is the fact that all (or most) of today's DSEs are to some extent experimental, and that the general layout of the UI and the solutions provided for the same tasks (browsing/navigating the text, the critical apparatus, the notes, etc.) differ from edition to edition.³ This

³ Some digital scholarly editions display the critical apparatus as a separate section that stands below the main text (see e.g. *The Parzival Project*: www.parzival.unibas.ch/editionen/ed4_001/index001.html and www.parzival.unibas.ch/editionen/ed019/index19.html or *Dante Alighieri: Commedia. A Digital Edition*: sd-editions.com/AnaAdditional/CommediaEx/CommediaExhome.html) or next to it (see e.g. *De trein der traagheid*: edities.kantl.be/daisne/ed/Tdt.htm?t=leestekst&c=P48 or the *Mark Twain Project Online*: www.marktwainproject.org/xtf/view?docId=letters/UCCL00206.xml;style=letter;brand=mtp#APP); others show it as a small pop-up that opens as the mouse passes over (see e.g. *The Codex Sinaiticus Project*: codexsinaiticus.org/en/manuscript.aspx) or when the user clicks on the connected lemma (see *Excerpts from the Chronicle of Matthew of Edessa*: byzantini.st/ChronicleME/text/excerpt1). In some editions, however, the critical apparatus is shown in a separate window that opens when the user clicks on the connected passage of the text (see *The Electronic Beowulf 4.0*: ebeowulf.uky.edu/ebeo4.0/CD/main.html), while in more recent cases it is placed in a small box that opens below the line where the lemma appears

means that while *traditional layout* editions allow for a certain degree of uniformity even if the edited texts may vary (because of language, historical periods, types of textual tradition, etc.), *innovative layout* editions may be compared more to software programs than to books in digital form when it comes to their UI layout, and as for every non-trivial software it is necessary to learn how it works. A book does not need any accompanying instructions, and to some degree this is also true for traditional layout critical editions, but the great variability that is typical of more recent DSEs requires some adjusting and, in some cases, the willingness to invest a certain amount of time to learn how to use the navigation tools.

As a consequence, modern DSEs suffer from several drawbacks:

- this lack of homogeneity means that the learning curve may be quite high, sometimes even frustrating for the less experienced user;
- it can also happen that an excellent content is made less usable by an inadequate UI: not all design choices enable the user to access and browse the edition data in an effective way;
- a further problem concerns editions which offer digitized images of the manuscript(s) and/or the full text of all witnesses: when the material to be managed increases beyond a certain threshold, the navigation of edition data becomes tricky, and UI design and implementation is the critical problem to solve;
- from an editor's perspective, almost every project heavily customizes the final edition UI: this not only adds to the *UI fragmentation* problem, but also makes it difficult - if not impossible - to set common standards and share the available publication tools among different projects.

We have noticed,⁴ however, that the reproduction of a fixed layout on the basis of printed critical editions is due not only to a natural conservative tendency: while the XIXth century arrangement of critical text and corresponding apparatus is a compromise, especially when it comes to the quantity of information that can be compressed in the apparatus layer, it is a very successful compromise nonetheless, to the point that printed scholarly editions are in no danger of extinction (quite the contrary, actually). When working on a DSE, one might think that the problem of space has gone away, and that the *digital editor* faces a much easier task when compared to the traditional one, but this is true in appearance only: on the one hand, we have an infinite storing space for philological data to be shown, on the other hand, the space to show it still is a two-dimensional surface only marginally larger than a printed page.

(see *The Wandering Jew's Chronicle*: wjc.bodleian.ox.ac.uk/HTML/WJC.html). For a complete list of digital scholarly editions, see Franzini, Sahle *A catalog of Digital Scholarly Editions*. The *ride* journal, a review journal for digital editions, is another useful resource (ride.i-d-e.de/).

⁴ See Di Pietro, ch. 1.3 *L'edizione Digitale*, and also ch. 2.2 *Analisi e progettazione concettuale*.

However, whatever size it may have and whatever visual comfort it may offer, a display is far from being a universal panacea for all woes caused by printing technology. Organizing and presenting information architectures with an increasing underlying complexity poses serious challenges to online critical edition. (Apollon and Bélisle 111)

In other words, things are possibly even more complicated than before, since the designer of any edition browsing software will have to take into account this paradox.

Speaking of browsing tools, the question one may legitimately pose about them is: who should design and develop this kind of software? In the past, each DSE project had its own set of tools specifically created to answer the project's needs, the obvious exception usually being when the same framework was used to build different editions within the same project and/or prepared by the same scholar.⁵ Only in more recent times there have been tools developed in such a way as to be usable for other projects. The approach, however, has been mainly based on the direct collaboration with ICT developers with little or no humanities background, requiring a patient and detailed explanation of the textual scholar's needs. The inherent danger in this approach is the fact that, since no scholar fully encompasses and represents all different methodologies existing in the textual criticism field, not only the browsing software will be limited to their knowledge and specifically tailored for their project's needs, but also that once the development directives are received they will be carried out to the letter: there will be no envisioning of other possibilities by the developers since they are unaware of what could be done to improve the software with regards to textual criticism functionality, and for the same reason they would not consider implementing a feature to supplement those already envisioned. The edition browsing tool becomes a perfect mirror of that scholar's approach to textual editing, often in relation to a specific work.

Since this, as hinted above, is a very difficult task, we think that the humanities scholar should be involved at all stages: design,⁶ implementation, and feedback. Their opinion is invaluable to decide which features and tools are actually important and useful within a particular electronic edition, and to find the most suitable methods to present the edition content in a more effective way than the traditional printed

⁵ See for instance *The Canterbury Tales Project*, currently published by SDE - Scholarly Digital Editions (www.sd-editions.com/index.html) and on the Textual Communities web site (www.textualcommunities.usask.ca/web/canterbury-tales). Another series of homogeneous and well designed digital editions was that created by Bernard J. Muir, in particular the *Junius 11* (McGillivray) and *The Exeter Anthology of Old English Poetry* (Cavill), but unfortunately the first is not available any more, and the second one is listed for a very high price. Note that in both cases the format chosen was that of a CD / DVD edition, not a web-based one.

⁶ On the importance of a good UI layout with regard to the effectiveness of a digital edition, see Rosselli Del Turco 2011.

edition. It is also crucial to receive feedback both during and after the development process, when a working product is released. Final users' criticism and suggestions, in particular, are essential to adjust the User Interface (and UX - User eXperience) aspects of any edition browsing tool.

In our experience, when developing such a tool (see the following section), the best workflow is the one relying on a prototyping process which goes through multiple iterations: the cycle starts with the design phase and the creation of several mockups to compare different options; then dynamic mockups⁷ and/or a working prototype are created to test the best options; after a few tests, always going back to the design table if the results are deemed unsatisfactory, a final layout is implemented in an alpha/beta version: if the feedback received is positive, then the next step is a new stable release.

2 The starting point: EVT 1

Edition Visualization Technology (EVT)⁸ is an open source tool to produce digital scholarly editions on the basis of TEI XML-encoded documents. Although it was born to serve the goals of a single project, the *Digital Vercelli Book* (Rosselli Del Turco 2017), it has been developed in such a way as to become a general purpose tool. In fact, there are several DSE projects using EVT, and more are in preparation by young researchers who have found in EVT the perfect tool for their needs. Some of them will be announced during the months to come. Here is a provisional list:

- the already mentioned *Digital Vercelli Book* project;
- the *Codice Pelavicino Digitale* project (Salvatori et al.);
- the *Tarsian* digital edition (Schulthess and Sankar);
- the viewer component of the *Clavius on the Web* project;⁹
- the digital edition of Gherardi's *Théâtre italien*;¹⁰
- the digital edition of Marciana Gr. Z 11 (379).¹¹

⁷ There are several Web sites offering this kind of service, see e.g. Invision (www.invisionapp.com/) or Moqups (moqups.com/).

⁸ Home page for the project with information and news about both versions in development (EVT 1 and EVT 2): evt.labcd.unipi.it/. See the *References* for details about distribution and code repositories.

⁹ Editors of this project are adding semantic, lexical, and user annotations to each transcription. EVT is used to show the text of each document together with the corresponding digitized images.

¹⁰ This is a forthcoming edition of Gherardi's first volume of the *Théâtre italien*, to be published on the web site of the pBDR - *piccola Biblioteca Digitale Romanza*: piccolabdr.humnet.unipi.it/.

¹¹ Current home page: humarec-viewer.vital-it.ch/. This is part of the wider HumaRec research project (humarec.org/).

As one might gather by browsing these projects, the first version of EVT is aimed at diplomatic/interpretative editions¹² accompanied by the images of the corresponding manuscript.¹³ The fundamental insight behind its design is to avoid inserting the edition data in the navigation software, but to build a website around the data itself: in this way, the scholar is free from the burden of web programming, so that s/he can focus on preparing the edition documents according to the *TEI Guidelines* and schemas. Note that the EVT viewer is based on the client-only model, thus there is no need to install and configure additional software on the server. After the web edition is generated using EVT, the final user can browse, explore and study it by means of a user-friendly interface, providing a set of tools – zoom, magnifier and hot-spots¹⁴ for manuscript images, text-image linking, and an internal search engine for the edited texts – for research purposes.

In EVT 1, the edition data parsing is performed by a chain of XSLT 2.0 stylesheets: starting from an XML document in the standard TEI P5 format, by applying a single XSLT stylesheet, the TEI/XML text is turned into a web-based application – using HTML5, CSS3 and JavaScript in a client-only environment – which can be easily deployed on a server and shared on the Web. With the (almost) feature-complete version 1.0 published in March 2016¹⁵, the development team started considering implementing the support for critical editions as the next logical step in the evolution of this tool. In fact, this essential feature had been suggested not only by the needs of the *Digital Vercelli Book* project, but also by several scholars that the team had met during presentations and papers given at Digital Humanities conferences.

The first consequence of this decision was an awareness that the UI was going to require a thorough redesign to accommodate the new features, so that both diplomatic/interpretative and critical editions of texts belonging to the same tradition could live side by side. Also, our initial plans already included the concept of a dialogue between diplomatic edition and critical edition, and vice versa, for example with the possibility to follow a variant to the image of the manuscript that preserves it.

Before starting with the UI redesign, however, we decided to undertake a full survey of the state of the art with regard to modern layouts for DSEs. The results,

¹² Also known as *documentary editions*, on their relevance see Pierazzo 2014; for a somewhat different view see Robinson 2013.

¹³ Note that, with a little tweaking of the configuration and thanks to recent support for critical notes, EVT 1 also allows you to create critical editions based on a *codex unicus*, as is the case for the *Codice Pelavicino Digitale*, it is, however, unsuitable for editions taking advantage of the proper *Critical Apparatus* module of the TEI schemas.

¹⁴ Hot-spots are interactive sections available on the image that are connected to a commentary or an explanatory note. These sections are highlighted on the image so that the user can easily identify them and access the linked additional information.

¹⁵ As announced on the *Edition Visualization Technology Blog*, “EVT version 1.0 has been released!”, visualizationtechnology.wordpress.com/2016/03/07/evt-version-1-0-has-been-released/.

partly available in Chiara Di Pietro's MA thesis (2016), are those briefly exposed as an introduction to this article: the first DSEs show a conservative tendency which gives way to more innovative and experimental forms of edition, but this positive development comes with the price of more complicated and heterogeneous UI layouts for the final user. Was the initial conservatism completely negative, though? Or could we learn a lesson from it? This question, unfortunately, had to wait until other, more compelling problems could be solved with regard to the development of the next version.

3 A change of paradigm

In fact, just as we were beginning the DSE survey, we realized how the underlying EVT 1 framework was much less expandable and flexible than we thought. Our first task was to analyze the problem, and to find a viable solution in the shortest possible time.

3.1 UI problems in EVT 1

As explained in the previous section, EVT has been designed and developed to be a flexible and general-purpose tool, in order to suit many different kinds of texts and editions, right from the start. Many of the features available in the current stable version (EVT 1.2), in fact, are the result of a collaboration and discussion with other projects, leading to an expansion of its functionality: the support for named entities, for instance, is a feature request originally filed by the *Codice Pelavicino Digitale* research team. Moreover, since EVT is distributed as open source software and is not tied to a specific edition project, every new feature added to the software is automatically available to all users.

As the development has progressed and the software has grown in terms of features, however, its complexity has increased as well. This was clearly visible in the configuration of the parameters related to the navigation and the internal management of the edition: to cover a greater number of use cases, in fact, the configuration variables and elements within the web application have increased considerably. This has not only made EVT less user-friendly, because it may take quite some time to understand the meaning of all available configuration options; it has also made the development of new functionalities more difficult and time-consuming because of the essentiality of checking that any new feature is not in conflict with the existing ones.

Furthermore, we also had to consider the fact that the JavaScript functions used to manage the entire web application have a great impact both on the main memory used by the browser and on the CPU time for its operation. As a consequence, for

each new feature added to the software, the performance of the web application itself tended to slow down considerably.

As a last remark, the XSLT code base had grown to such an extent that it was very difficult for a newcomer to fully grasp its inner working in a short time, which meant more time and resources necessary to train new contributors.

3.2 Moving to a new framework

For these reasons, we decided to remodel the entire structure of the software in order to make it lighter, more manageable and more adaptable. We decided to take advantage of the Model View Controller (MVC) design pattern, which is a very popular architecture in object-oriented programming since it allows one to separate the ways in which the information is presented to the final user from the internal representation of the data and the domain logic that determines how data are created, stored and managed (Krasner and Pope).

Wanting to maintain the original feature set of EVT, and not give up the *client-only* approach, we decided to use AngularJS (Branas; Jain et al.), a JavaScript framework inspired by the MVC programming logic, especially suitable for the development of client-side Web applications; among other things, this framework allows to define custom HTML directives and uses the data-binding mechanism to associate the model of the data to the UI elements and to manage the updates of the latter avoiding the direct DOM manipulation.

Before the code refactoring, EVT was composed of two main units: EVT Builder, for the transformation of the encoded text using special XSLT 2.0 templates, and EVT Viewer, to visualize the web-edition resulting from the transformation in a browser and to allow the user to interact with it using the available tools. The idea behind the new version of EVT is to leave to the latter the task of reading and parsing the encoded text by means of JavaScript functions, and store as much as possible within a data model that persists in the client main memory. It is organized in such a way that it allows a very quick access to the data if need be (as far as our empirical tests show). This has obviously led to the elimination of the EVT Builder level, and therefore it allows to open a digital edition directly in the browser without any previous XSLT transformation (fig. 3).

The process of refactoring has been quite complex because of all the issues at stake and because of the many user interface changes, but the new design pattern, combined with use of the AngularJS framework, has led to a more user friendly and reactive web application. In this paper, we will focus particularly on the issues related to the development of critical edition support, exploring the path that led us to choose a specific solution among different possibilities.

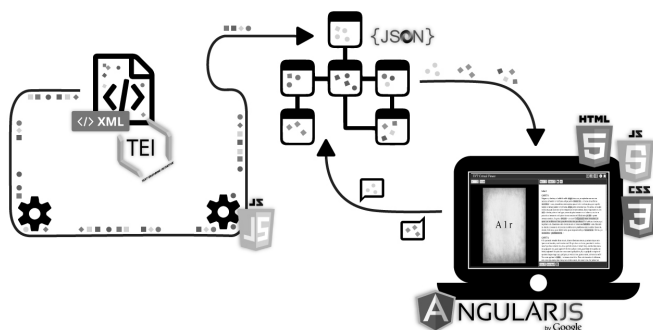


Figure 3: EVT 2 data flow.

3.3 Flexibility and customization of the final product

In addition to the elements inherited from tradition, in a digital critical edition it is possible to find different kinds of textual material (texts, images, metadata, etc.), whose presence or absence is due to both external factors, such as the unavailability of certain content, and conscious choices made by the editor, who selects what is to be offered to the reader. In the world of digital textual criticism, the scholar can encode a text at any level; hence, it becomes very important to offer the possibility to decide which information is going to be published and what is going to be left (maybe temporarily) aside, without necessarily deleting or modifying the original encoded text. This also means that part of the available content could be hidden by default, and only shown *on demand*, when the user needs to access specific textual components of the edition.

This is why, in the development of EVT 2, we tried to create a very flexible and dynamic environment which allows the editor to configure and customize the final product in an intuitive and fast way. Thanks to a JSON configuration file, which is opened at the very first initialization of the web application, the editor can override all the default settings, both in terms of content offered to the reader and in terms of tools to be included in the digital edition itself, based on the real needs of the reader to whom it is addressed. For example, the editor will be able to:

- select the type of variations which will be shown according to a principle of relevance defined by the editor;
- select which witnesses among all the encoded ones are deemed relevant, with regards to the stemma of that particular textual tradition or for other reasons related to the goals of the specific digital edition one wants to achieve;

- choose the initial view mode, e.g. a welcome message rather than the critical text and the commentary notes, or a parallel view of critical text and selected witnesses.

In addition, thanks to a dedicated stylesheet, the scholar can completely customize the graphic layout of each single TEI element (for example deletions, additions, omission, etc.), without affecting the general appearance of the whole web application.

4 Discussion of UI layout and appearance in EVT 2

According to the general principles of Human Computer Interaction¹⁶, when you design and develop interactive applications, one of the main goals is to make them usable and accessible for the final users. The best UI is the *invisible* one (Fishkin; Krishna), the one that does not hinder the browsing/gathering of content and is designed in such a way that it maximizes the efficiency and the ease of use (ibid.).

For reasons of space, we will not list here all the rules of a good UI design¹⁷; in general, one should find a good balance between *expressivity*, i.e. the ability to transmit the desired information, and *efficiency*, i.e. the ability to communicate certain content so that it is easily available. It is therefore essential to avoid considering only the internal, functional aspects, and try to always take into account the user and the tasks s/he may intend to perform, designing the appearance of the contents only after a thorough analysis of the basic requirements of the system and the functionalities it has to offer.

In addition to these general considerations, as remarked above, creating a critical edition navigation tool presents specific problems, namely issues related to the overall layout of the UI and its individual components; also, remember that, for the latter, there is no consistency in their graphical appearance and with regard to how they are used in current digital scholarly editions. Thus, before defining a complete graphical UI for EVT 2, every single component was modeled separately, defining their unique characteristics and modalities of mutual interaction. Such modeling started from

¹⁶ Human Computer Interaction (HCI) is a discipline born in the early 1980s, which deals with the design, evaluation, and implementation of interactive computer applications and the study of the main phenomena surrounding them, with the main aim of creating usable, safe and effective products. The term HCI was first introduced in 1983 by Card, Moran and Newell in their book *The Psychology of Human-Computer Interaction*, in which they highlighted that the computer communicates with the user flexibly and openly. HCI principles aim to make technologies appropriate to the categories of users to which they are addressed and allow to take into account systematically the characteristics of final users, with their needs and capabilities, and the contexts in which they interact with the technological product (Gamberini et al. 3).

¹⁷ For a basic reference see Nielsen, the ISO 9241-11 standard and Card et al. Note that, in Italy, there are mandatory rules about accessibility of Web sites since 2004 (Legge 4/2004 “Disposizioni per favorire l’accesso dei soggetti disabili agli strumenti informatici”, see it.wikipedia.org/wiki/Legge_Stanca).

the analysis of the traditional editorial conventions, as we considered essential to impose as a minimum goal for the final product that it may be able to offer the scholars what they are used to see in a critical edition. Then, we tried to extend the features of every single element in order to offer innovative ways of content presentation and interaction, so that the tool could allow both a better access to what is traditionally considered essential when publishing a critical edition (see list below), and to what is normally excluded or relegated to not directly accessible positions – for example the orthographic variations and the full text of the witnesses – because of space constraints. This is the approach that we followed for the design of all the components identified: it has influenced both the graphical aspects of TEI elements presentation and the functional aspects of interaction and access to content. Listed below are the main components identified¹⁸ and their primary features.

- Critical text: it is the primary object of the publication and, for this reason, it should have a prominent position and be easily distinguishable from the rest of the edition.
- Critical apparatus: it is traditionally static and consists of the minimum necessary information (lemma and significant variations); to make the edition more useful as a research tool, the apparatus should be extended and enhanced with information which is normally not included in printed editions (such as orthographic variants) and with new interactive features (for example, direct access to the context of a given reading).
- Support materials (prefatory matter, indexes, *conspectus siglorum*, etc.): as secondary materials, they should be placed in a decentralized area of the interface, but should be kept easily accessible to the user who requests them.
- Full text of the witnesses: since there is no longer the need to fall within the limits imposed by the printed page, it becomes possible to support the critical text by accompanying it with the text of all the witnesses used in the transcription, collation and text encoding phases.
- Lemma and alternative readings: they should be easily identified within the critical text and in the transcription of the single witness, and enriched with any additional information available (for example their type, or degree of certainty, or the responsible for a specific reading).

In parallel with the analysis of the components to be integrated in the interface, it was also necessary to identify the main interaction tools to be provided to the user; in particular, we considered giving the reader the possibility to compare the text of specific witnesses, possibly in relation to the critical text, to assess the textual variability globally, to distinguish and highlight the reading depending on their metadata (i.e. type, hand, certainty, responsibility, etc.) and to gain access to a very

¹⁸ See Di Pietro, ch. 2.2 *Analisi e progettazione concettuale*.

dynamic critical apparatus that hosts all the possible content and allows the user to rapidly move among the readings and their context. Some of those features were inspired by some of the existing digital editions analyzed in the initial phase of the refactoring process, when we assessed the state of the art, and improved on their potential weaknesses.

4.1 The global UI

Based on the analysis presented above, the real work of graphic design started. As we will see later, the most critical and difficult elements to design were the critical apparatus and the witnesses collation view, even considering the fact that in this first phase EVT 2 was limited to critical edition support, without implementing the views related to diplomatic and interpretative edition levels featured in EVT 1.¹⁹

Considering the overall look, although the initial idea was to maintain a sort of continuity with the UI of EVT for diplomatic editions, the proposed final solution – as we will see – slightly departs from the latter. The main distinctive feature is the removal of all the wasted space around the image and text panels, since it can be considered an obstacle with regards to the management of editions with parallel texts. In fact, in the case of a diplomatic edition with transcriptions and scanned images, the margin around the main container entailed a simple reduction of the image and text panels, without a significant loss of space for their content; in an edition where there could be the possibility of providing a parallel comparison of the full text of all the encoded witnesses, on the other hand, even a few pixels of margin space can make the difference.

The GUI (Graphic User Interface) we designed is composed of two main elements:

- a running header with the title of the edition and a toolbar for all the global tools, for example the information about the edition itself, or the search functionality;
- a body composed of as many panels/frames as necessary for the correct organization of the content in a specific view mode. In every frame there will be a header with navigation tools, a footer with local tools, and a body, eventually divided into different sections depending on the content to be displayed in it (fig. 4 and 5).

Regarding the choice of colors, we decided to take into account the basic principles of graphic design (Galitz; also see Gamberini et al.) which suggest to use cold and neutral colors for the boundary elements and the interface navigation, and to leave the warm and vibrant colors the role of drawing attention to important information. Initially, we defined two possible palettes: a brownish one, to maintain a sort of continuity with EVT 1, and a more neutral one verging on blue-gray tones. To further highlight

¹⁹ On the latter, see Rosselli Del Turco 2015.

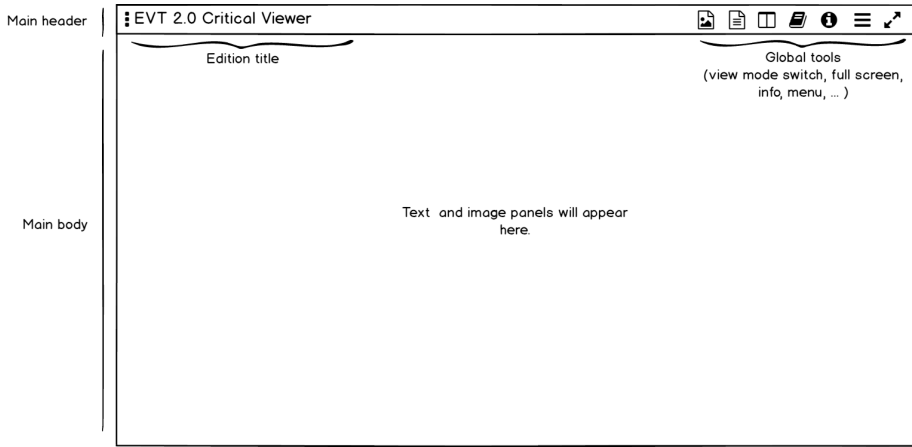


Figure 4: EVT GUI design. Main layout structure.

the difference with the previous version of the software, we decided to use the latter palette.

4.2 Parallel view and scalability problems

The first problem we faced was one related to the collation view and the interface scalability in the presence of a theoretically infinite number of witnesses to compare. Well aware from the very beginning that the computer screen sets limits in terms of amount of content that can be displayed simultaneously, the main goal we wanted to achieve was not to show all the available witnesses at the same time, but to display as many of them as possible while maintaining a certain order and regularity in the interface.

The first three proposals for the layout were based on the existing Text-Text view of EVT 1:

- witnesses displayed one under the other, into a panel juxtaposed to the main text (fig. 6);
- witnesses displayed under the main text, next to one another, in a box that scrolls horizontally (fig. 7);
- panels of equal dimensions for the comparison between witnesses only (fig. 8).

To avoid a disruption of the original layout because of the addition of new panels, these solutions were designed for a comparison of a maximum of four witnesses at a time (or three witnesses and the critical text).

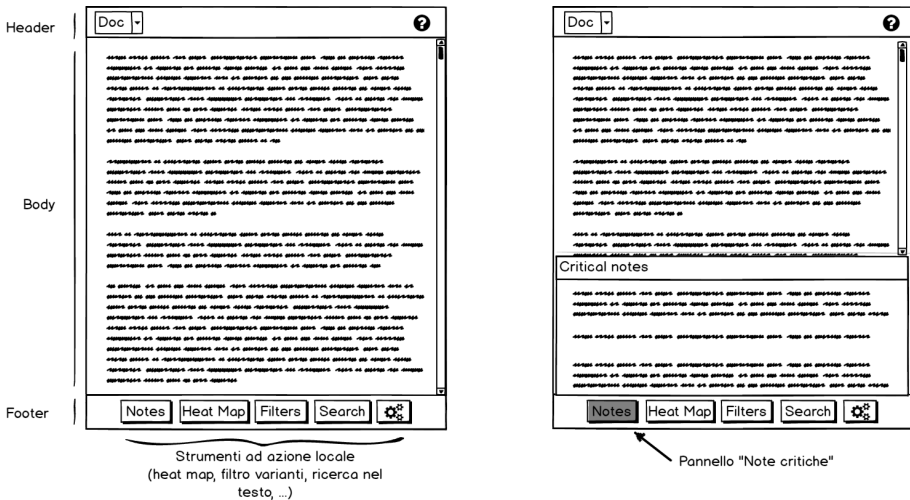


Figure 5: EVT GUI design. Single panel development.

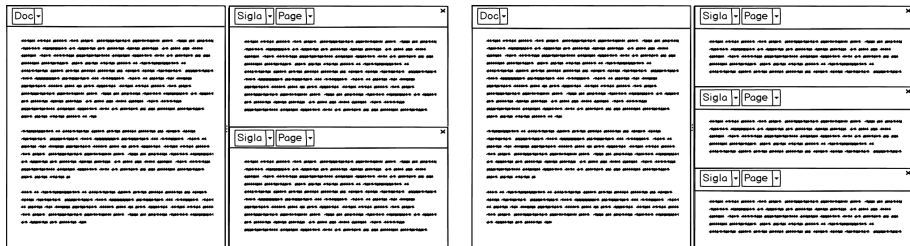


Figure 6: EVT GUI design. Witnesses comparison: panel juxtaposed to main text.

Despite being able to group similar items so that they are easily recognizable, thereby respecting one of the indications of HCI studies, and to always maintain a harmonic and well-structured interface, those proposals were not considered satisfactory. In fact, in the hypothetical usage case we imagined, the simultaneous consultation of more texts seemed more natural when the texts are arranged next to each other rather than one above the other. Therefore, we tried different approaches and finally reached consensus on the ultimate proposal, which provided the alignment of the compared witnesses on the horizontal axis (see fig. 9).

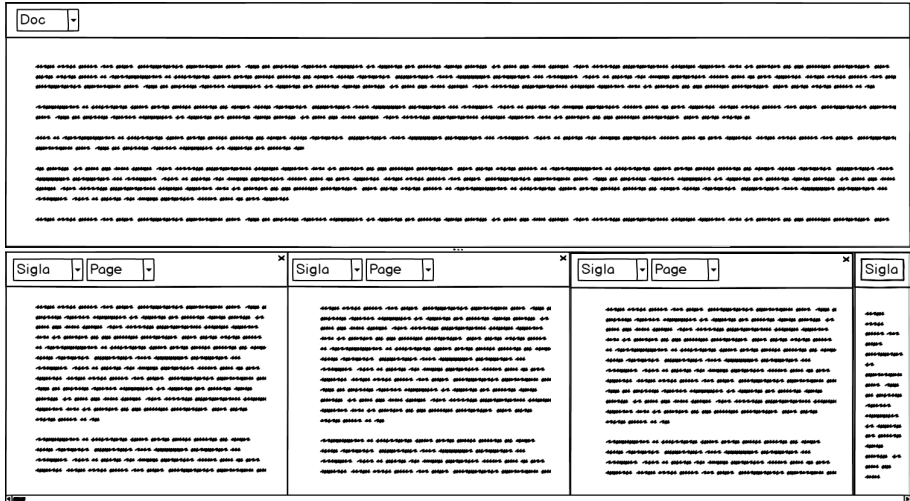


Figure 7: EVT GUI design. Witnesses comparison: scrolling panel below main text.

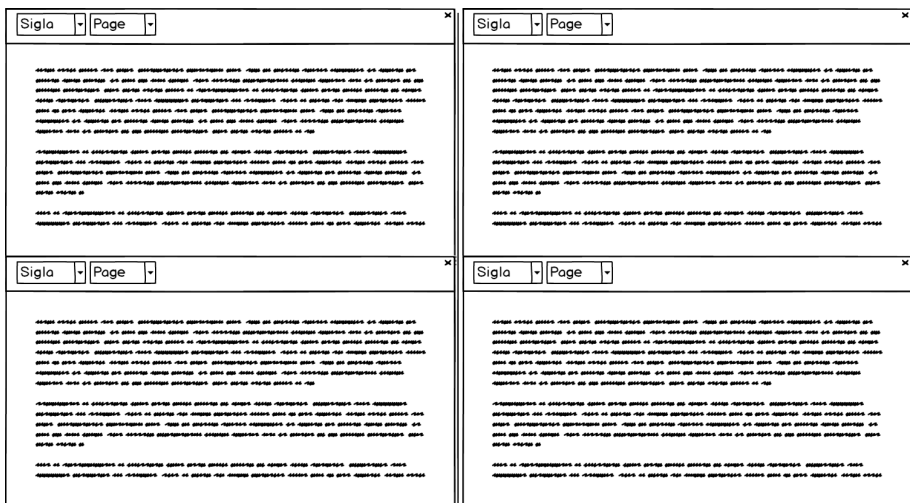


Figure 8: EVT GUI design. Witnesses comparison: equal dimensions panels.

Doc	Sigla	Page	Sigla	Page	Sigla	Page
<p> 1. Obiectivele proiectului sunt: <ul style="list-style-type: none"> - Creșterea calitatii serviciilor oferite clienților. - Reducerea costurilor de producție. - Creșterea eficienței proceselor de producție. - Creșterea competitivității pe piața internă și externă. </p> <p> 2. Beneficiarii proiectului sunt: <ul style="list-style-type: none"> - Clientii companiei. - Angajații companiei. - Partenerii de afaceri. - Comunitatea locală. </p> <p> 3. Resursele necesare sunt: <ul style="list-style-type: none"> - Resurse umane: 10 persoane. - Resurse financiare: 100.000 lei. - Resurse materiale: 50.000 lei. </p> <p> 4. Planul de implementare este: <ul style="list-style-type: none"> - Faza 1: Analiza de piață și identificarea nevoilor. - Faza 2: Proiectarea și dezvoltarea soluțiilor. - Faza 3: Implementarea și testarea soluțiilor. - Faza 4: Monitorizarea și evaluarea rezultatelor. </p> <p> 5. Riscurile identificate sunt: <ul style="list-style-type: none"> - Riscul de schimbare a cererii de piață. - Riscul de creștere a costurilor de producție. - Riscul de scădere a eficienței proceselor de producție. - Riscul de pierdere a competitivității pe piață. </p>	<p> 1. Obiectivele proiectului sunt: <ul style="list-style-type: none"> - Creșterea calitatii serviciilor oferite clienților. - Reducerea costurilor de producție. - Creșterea eficienței proceselor de producție. - Creșterea competitivității pe piața internă și externă. </p> <p> 2. Beneficiarii proiectului sunt: <ul style="list-style-type: none"> - Clientii companiei. - Angajații companiei. - Partenerii de afaceri. - Comunitatea locală. </p> <p> 3. Resursele necesare sunt: <ul style="list-style-type: none"> - Resurse umane: 10 persoane. - Resurse financiare: 100.000 lei. - Resurse materiale: 50.000 lei. </p> <p> 4. Planul de implementare este: <ul style="list-style-type: none"> - Faza 1: Analiza de piață și identificarea nevoilor. - Faza 2: Proiectarea și dezvoltarea soluțiilor. - Faza 3: Implementarea și testarea soluțiilor. - Faza 4: Monitorizarea și evaluarea rezultatelor. </p> <p> 5. Riscurile identificate sunt: <ul style="list-style-type: none"> - Riscul de schimbare a cererii de piață. - Riscul de creștere a costurilor de producție. - Riscul de scădere a eficienței proceselor de producție. - Riscul de pierdere a competitivității pe piață. </p>	<p> 1. Obiectivele proiectului sunt: <ul style="list-style-type: none"> - Creșterea calitatii serviciilor oferite clienților. - Reducerea costurilor de producție. - Creșterea eficienței proceselor de producție. - Creșterea competitivității pe piața internă și externă. </p> <p> 2. Beneficiarii proiectului sunt: <ul style="list-style-type: none"> - Clientii companiei. - Angajații companiei. - Partenerii de afaceri. - Comunitatea locală. </p> <p> 3. Resursele necesare sunt: <ul style="list-style-type: none"> - Resurse umane: 10 persoane. - Resurse financiare: 100.000 lei. - Resurse materiale: 50.000 lei. </p> <p> 4. Planul de implementare este: <ul style="list-style-type: none"> - Faza 1: Analiza de piață și identificarea nevoilor. - Faza 2: Proiectarea și dezvoltarea soluțiilor. - Faza 3: Implementarea și testarea soluțiilor. - Faza 4: Monitorizarea și evaluarea rezultatelor. </p> <p> 5. Riscurile identificate sunt: <ul style="list-style-type: none"> - Riscul de schimbare a cererii de piață. - Riscul de creștere a costurilor de producție. - Riscul de scădere a eficienței proceselor de producție. - Riscul de pierdere a competitivității pe piață. </p>	<p> 1. Obiectivele proiectului sunt: <ul style="list-style-type: none"> - Creșterea calitatii serviciilor oferite clienților. - Reducerea costurilor de producție. - Creșterea eficienței proceselor de producție. - Creșterea competitivității pe piața internă și externă. </p> <p> 2. Beneficiarii proiectului sunt: <ul style="list-style-type: none"> - Clientii companiei. - Angajații companiei. - Partenerii de afaceri. - Comunitatea locală. </p> <p> 3. Resursele necesare sunt: <ul style="list-style-type: none"> - Resurse umane: 10 persoane. - Resurse financiare: 100.000 lei. - Resurse materiale: 50.000 lei. </p> <p> 4. Planul de implementare este: <ul style="list-style-type: none"> - Faza 1: Analiza de piață și identificarea nevoilor. - Faza 2: Proiectarea și dezvoltarea soluțiilor. - Faza 3: Implementarea și testarea soluțiilor. - Faza 4: Monitorizarea și evaluarea rezultatelor. </p> <p> 5. Riscurile identificate sunt: <ul style="list-style-type: none"> - Riscul de schimbare a cererii de piață. - Riscul de creștere a costurilor de producție. - Riscul de scădere a eficienței proceselor de producție. - Riscul de pierdere a competitivității pe piață. </p>			

Figure 9: EVT GUI design. Witnesses comparison: adopted proposal.

[illegible]

Figure 10: EVT GUI design. Witnesses comparison.

In order to be able to handle the comparison of a hypothetically infinite number of witnesses, always maintaining a well-structured and clean interface, we chose a compromise solution that leverages the principles of the responsive design only in part.

Starting from the situation in which the critical text is compared to a single witness, the addition of a new panel to the collation view involves an automatic resizing of the visible boxes, so that each one of them will occupy about one-third of the space (fig. 10).

If a third witness is then added to the comparison, the resizing will no longer be proportional to the available space, but will be led by a minimum width. From that moment on, the new boxes will simply be placed next to one another, without being

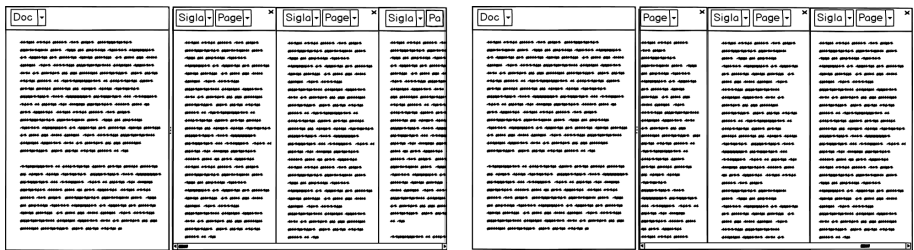


Figure 11: EVT GUI design. Witnesses comparison.

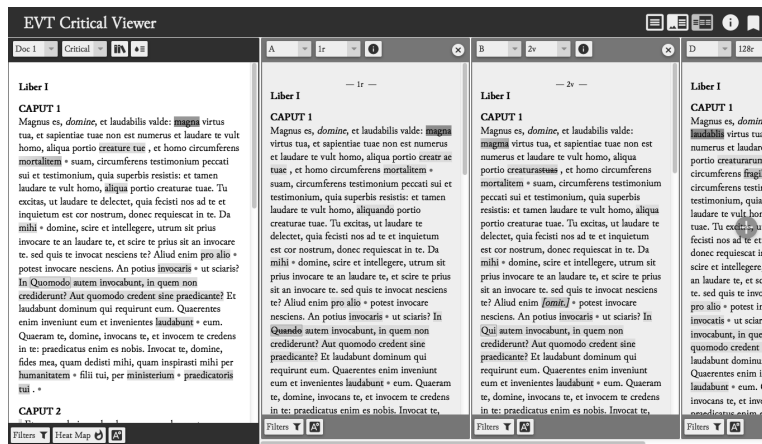


Figure 12: EVT GUI design. Final implementation of witnesses comparison.

resized. As shown in the following figures (fig. 11 and 12), the interface will remain stable and clean, and the access to the witnesses that are not immediately visible will be possible thanks to a horizontal scroll bar.

The container of the critical text will remain fixed in the first third of the interface and will visually have more importance: in this way it will always be well distinguishable from the text of the encoded witnesses. As we can see in the preceding image, this distinction is also reinforced by the color assigned to its container panel.

As in the previous proposals, this solution implies that it is still not possible to display more than three or four witnesses at a time (the exceeding witnesses will flow outside the screen); however, it is an unavoidable problem, and we believe that the proposed layout can be regarded as a good compromise. In fact, although a tradition can count a very large number of witnesses, the reader hardly feels the need

to compare them all together at the same time, since the most interesting ones, those corresponding to the families of witnesses placed in the higher levels of the stemma, are usually few.

4.3 The critical apparatus

The element that has brought major difficulties in the planning stage was the critical apparatus layer: it includes a list of readings which were excluded from the published text, but are nonetheless fundamental to document and justify the editor's choices.

One of the most common solution used within the digital critical apparatus is the hyperlink from a word in the text to the linked apparatus, usually placed at the bottom of the screen, in a separate window or in an inline pop-up²⁰. While remaining faithful to the traditional method of presentation, this solution offers an immediate access to the list of variants for a given portion of the text: after the lemma, all the rejected variants are listed, followed by a list of *sigla* which are converted into hyperlinks for a quick access to the full context of each reading.

Since we decided to follow the editorial conventions typically followed by the printed editions as much as possible, we tried to find a good compromise solution: features and elegance of the traditional apparatus on one side and access to a wider content and more opportunities of interaction on the other side.

First of all, we had to decide the best positioning for it.

Our first choice was a pop-up enriched with more information about the variant. Within it, the substantive variants, the orthographic ones, and the critical notes are displayed side by side; they are organized in three distinct sections and the first ones are given a different and more immediate visibility (fig. 13).

As we can see from the image, in the upper part there is the traditional apparatus, composed of the lemma, optionally followed by the *sigla* of witnesses attesting that reading, a square bracket and the list of rejected variations followed by the *siglas* of the witnesses attesting them. The lower degree of importance assigned to the orthographic variations that are displayed in the middle part reflects also on their look and feel: smaller font and access through an expansion box.

This first proposal was rejected mainly because of the intrinsic nature of the pop-up: it is a very small element that will hardly be able to hold more than a couple of variants; moreover, it is effectively difficult to handle in a responsive and dynamic interface such as EVT.

Thus, we tried a different approach: using a new panel juxtaposed to the main text, where the apparatus is displayed in a traditional way, but constantly updates when the text scrolls (fig. 14).

²⁰ See the examples mentioned in the *Introduction*.

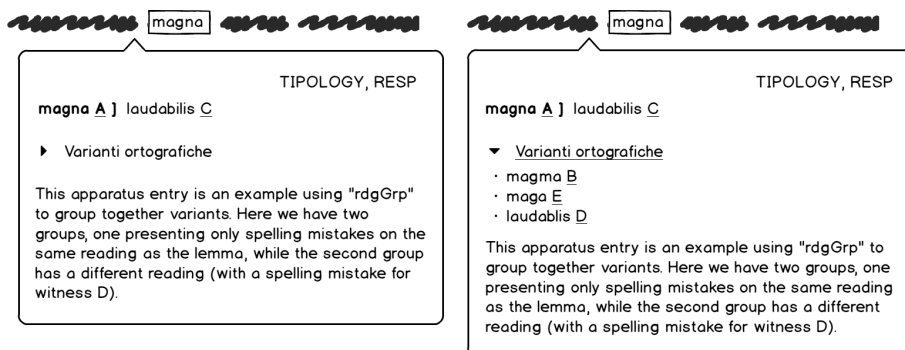


Figure 13: EVT GUI design. Critical apparatus: inline pop-up.

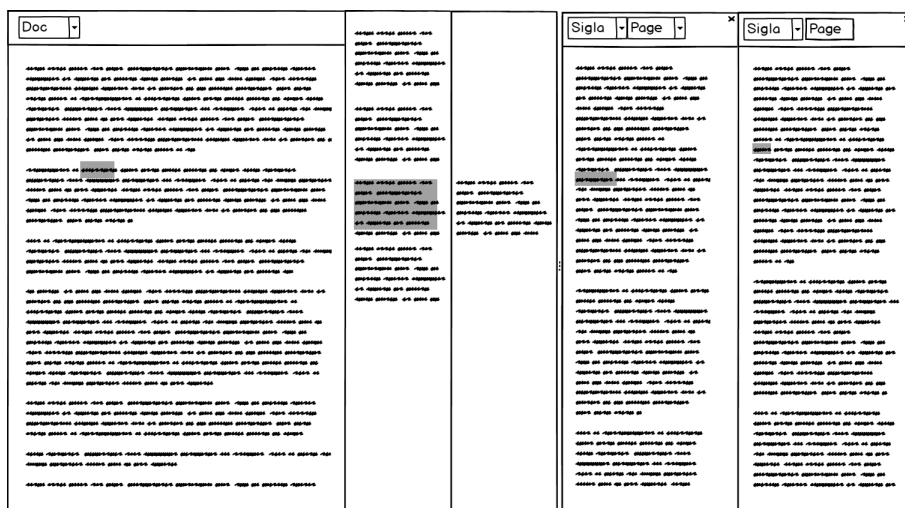


Figure 14: EVT GUI design. Critical apparatus: separate panel juxtaposed to main text.

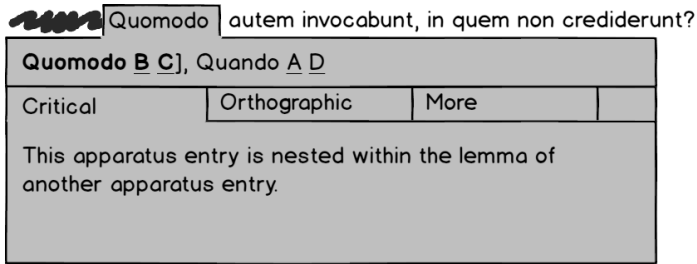


Figure 15: EVT GUI design. Critical apparatus: adopted proposal.

This solution allowed us to divide and distinguish the text from the apparatus itself more efficiently, but had the main problem of reducing the space generally available. Moreover, in the case of very long apparatus notes, a text that is lined up vertically tends to be more difficult to read.

Therefore, we defined a third and final proposal that consisted of an inline box that opens when clicking on one reading, and presents its content opportunely divided by typology (fig. 15).

In this panel, the more traditional part of the apparatus – composed of the lemma and significant variants – is positioned at the top, in a section that remains fixed, while the additional content of interest is inserted in a lower, scrollable box, divided into specific and easily accessible tabs. Among the additional content, the reader can find the critical notes, the orthographic variations, and the metadata associated to the apparatus itself, such as the responsibility for that reading or the degree of certainty.

As the result of various considerations, this final proposal was chosen as the definitive solution for the critical apparatus: it was considered a good compromise, one that allows the user to study the critical apparatus without the need for additional panels and without losing focus on the main text. In addition, it offers a virtual space that is much larger than that of the pop-up, it does not cover the text and it is suitable to be easily enriched with other functionalities, such as groupings of variants or other interesting content (fig. 16).

4.4 Increased visibility and interactivity of the readings

The reading chosen as *lemma* and those recorded in the witnesses have an important role in a critical edition as they provide both information about the variability of the tradition as well as details about the choices made by the editor. Therefore, the presence of text portions for which there are alternative readings should be visually expressed.

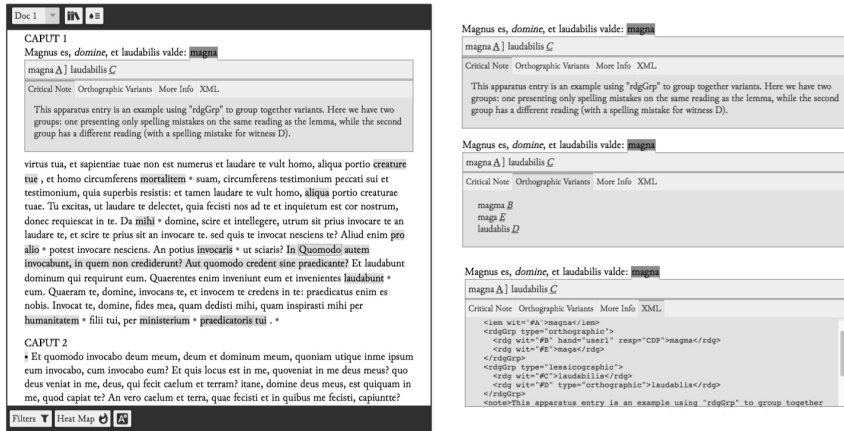


Figure 16: EVT GUI development. Critical apparatus.

After evaluating several graphical cues, including the underline and bold styles, we decided to use the background color to highlight variants, as it allows to convey additional and combined information associated with the readings: it is possible to correlate different tones to distinct typology (indicating, for example, the omissions in blue and the false emendations in red) and indicate the variability of the tradition with the color intensity (the more intense the color, the greater the variability registered). The significance associated with each color, of course, should be explained in an appropriate legend (fig. 17). Since the usability rules advise not to assign colors to essential information, in the future it will be necessary to conduct a more thorough and targeted study in order to choose an alternative graphic solution that causes no loss of information if the user is color blind or otherwise unable to fully distinguish colors. Since the reader may not be interested in every reading, and may want to focus only on a certain typology, we decided to provide a specific tool that allows one to filter out readings that match a specific combination of metadata (for example, all the additions made by a specific hand) (fig. 18).

4.5 Heat map for the textual variability

Following the example of Juxta²¹, we decided to use a map of color intensity in order to provide the reader with immediate information about the variability of the textual

²¹ Juxta is a stand-alone desktop application that allows to compare and collate different versions of the same text and export the results in a format that is aligned with the TEI standards. Thanks to the available APIs (Juxta Commons), it can also easily be integrated into other software.



Figure 17: EVT GUI development. Highlighted readings with explanatory legend.

tradition. According to this artifice, the background color of the *lemmas* in the critical text will be more or less intense according to the number of alternative readings recorded within the tradition: the more intense the color, the greater the number of alternative readings recognized by the system as registered for a specific critical entry (fig. 19).

4.6 Additional materials hidden, but easily accessible

All the additional materials (i.e. the introductory note in which the editorial criteria are exposed, the bibliography, the specifics of coding, etc.), have been made available to the reader only on his/her explicit request. Since those are global utility instruments, the access to them is guaranteed by means of an appropriate button positioned outside of the textual containers, in the main header, available at all times (fig. 20).

4.7 The bookmark for a direct reference to a section of text

One important problem that comes with many digital scholarly editions is the impossibility to properly cite a specific section of text. Since, in a web edition, there



Figure 18: EVT GUI development. Filters of readings.

are no pages to refer to, it is often very difficult to find a way to reference a specific paragraph, commentary, or critical note.

Thus, when defining the tools to offer in EVT, we decided to include a ‘bookmark’ to tackle this problem and try to solve it. At the moment, the parameters that can be tracked are the display mode, the document, the page, the edition level, the list of displayed witnesses (including the number of their current folios/pages) and the selected critical entry; in the future, more sections will be taken into consideration (e.g. the paragraph or the line). When first loading the edition, if one or more of those parameters are set in the URL, the interface will be reorganized in order to show the exact portion of text referenced by the URL itself.

A specific bookmark button inserted in the top bar will make it possible to always retrieve a bibliographic reference, enriched by the hyperlink, of the current view (fig. 21).

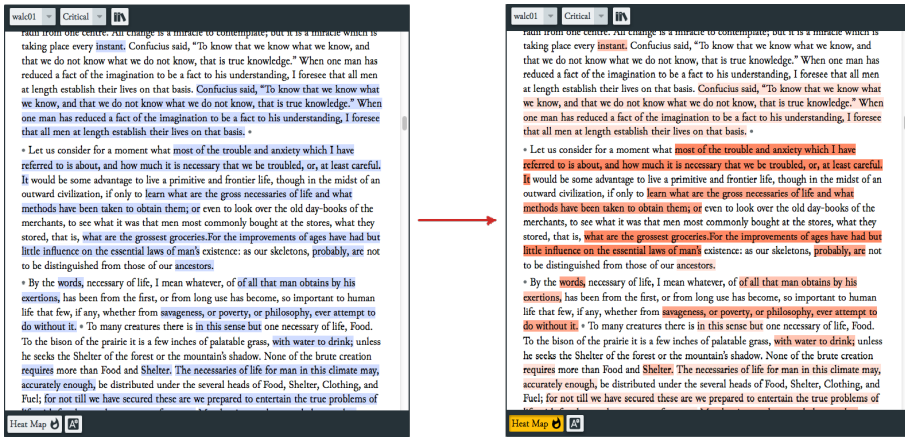


Figure 19: EVT GUI development. Heat map.

5 Future development

After every new EVT release, development slows down so that we can gather feedback from our users or other interested parties. This feedback helps us to adjust the User Interface and/or improve specific features, fix the inevitable bugs, etc. It is also very important to ‘step down’ for a while and reconsider past choices. So far, we have received little criticism for EVT 2, which is good in a way (“People like the new version!”), less so in other ways (“What about this feature/design we were unsure about?”). As explained above, the other method we use to evaluate the soundness of our decisions is through collaboration with DSE projects that have different goals and different problems than our own. This also allows us to consider the inclusion of new features and a re-design of the current layout.

An assessment of current features, carried out after we received feedback²² for the alpha version released in July 2016, confirmed that the path we have chosen to tread is sound, and that the mix of an innovative way to present the overall textual information (a drop down widget for each variant showing separate areas for each aspect of the apparatus) and the traditional critical apparatus entry (at the very top of the drop down widget, and thence in the most visible position) is effective and user-friendly for the final user. A click on the highlighted variants is an intuitive action even for unskilled users – perhaps the only aspect that could be improved upon

²² We receive feedback from our users as a mix of email messages and comments to our announcements on social media. However, we have also used Google Forms to perform surveys with regard to major releases.

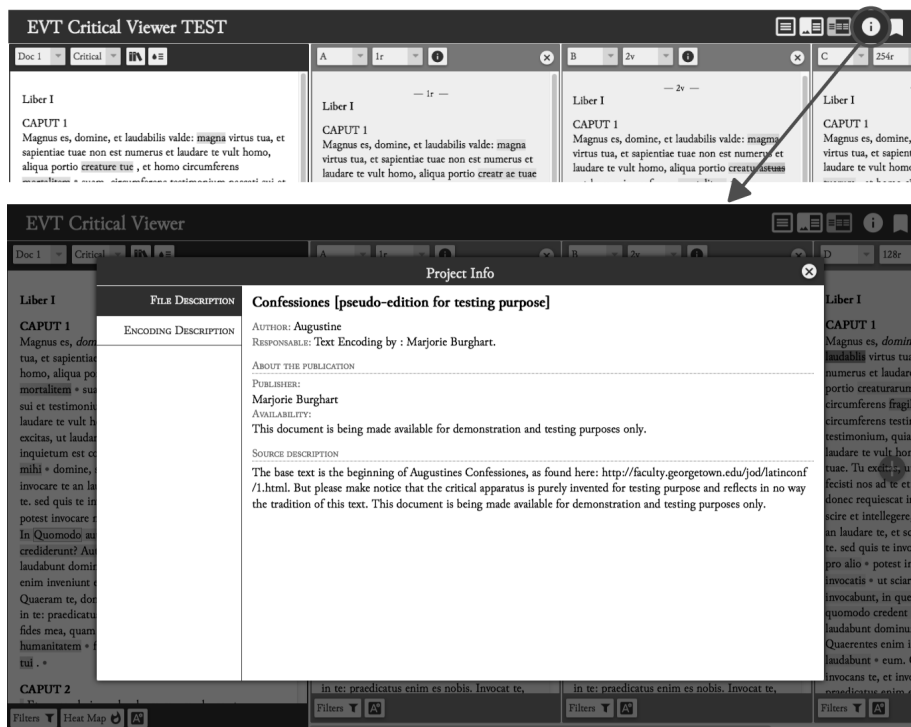


Figure 20: EVT GUI development. Edition prefatory matter.

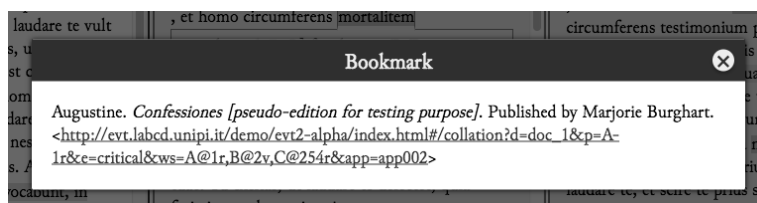


Figure 21: EVT GUI development. Bookmark.

is discoverability – and bringing up the apparatus content in its most familiar form makes the user feel at ease, at the same time proposing further, more sophisticated information that can be accessed in the lower part of the widget.

This successful coupling of innovation and familiarity led us to consider expanding EVT capabilities in such a way that we could propose the critical apparatus layer as a whole, in a dedicated text panel, instead of a local, *per variant* entry. We surely don't want to go back to a limiting layout model, but it is true that the critical text view at the present moment wastes a lot of precious space on the sides, space that could be used to include a separate panel hosting the apparatus view. A further advantage of this approach is that the second panel could include more content, such as a supplementary critical apparatus layer, an *apparatus fontium*, a sources and analogues textual view, etc., leaving room for enriching the information that the editor makes available to the user.

If the critical text view is expanded by adding a second text panel, the way philological information is displayed could be made context-driven:

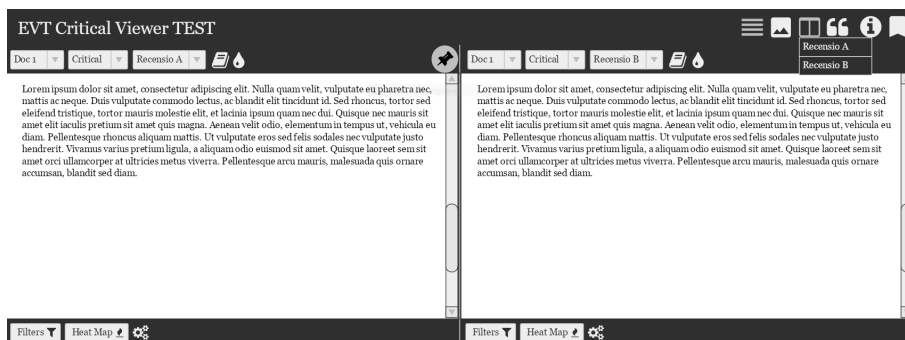
- when the user is browsing the critical text view, a click on a reading will highlight the corresponding apparatus entry in the critical apparatus panel; the same mechanism would apply for the *apparatus fontium*;
- when the user is browsing the collation view, space constraints would not allow to show the full apparatus panel – the area on the right of the critical text is used to show one or more of the available witnesses – so the more compact, single variant apparatus entry by means of the drop-down widget makes perfect sense and allows to access all the relevant information.

The double text panel view as standard view for the critical text plus apparatus layers will also be useful in a particular case that we are considering to support, that of a double *recensio* for a complex textual tradition (fig. 22). This is still in the planning stage and will probably be implemented for a stable version of EVT 2.

On a more technical level, we have planned to migrate the software to the new version of Angular²³, which was released as a stable version during September 2016 (Frost et al.), in order to be always synchronized with the latest possible technology. This new version of the framework is a complete re-write of the previous one and will not be backward-compatible, but it is easier to learn (for absolute beginners, in particular) and it has increased the overall web application performances²⁴.

²³ See the home page for the new version: angular.io/.

²⁴ See the full announcement for the final release version of Angular 2: angularjs.blogspot.it/2016/09/angular2-final.html. For more information about the new architecture: angular.io/guide/architecture.

Figure 22: EVT GUI development. Double *recensio*.

6 Conclusion

In this paper, we have shown how an essential requirement, the addition of support for critical editions in EVT, has called for a debate on the broader subject of UI design for digital scholarly editions within the development team. This reflection, combined with more technical considerations on the issues of development and evolution of the initial EVT version, led us through a series of phases (design, prototype, testing, evaluation) which resulted in a new software architecture and a new UI layout for EVT. The composite nature of the critical edition and especially the lack of a standard form for the electronic publication have been a major challenge in defining the global layout and modeling of each component. The difficulties encountered were not few, especially as regards the critical apparatus layout and the interface scalability in relation to a possibly very large amount of content. However, we believe to have reached an effective and visually harmonious solution which can improve and enrich the user experience in the fruition of contents. The initial proposals (preliminary discussion documents, graphical mockups) were guided by the desire to arrive at a full exploitation of the potential of the digital environment, while always maintaining a certain connection with traditional solutions. The solutions implemented in the current version of EVT 2 do not presume to be conclusive or definitive, but they want to be the starting point for further discussions on the matter.

As we stated in the introduction, we are convinced that reevaluating the tradition and the concept of familiarity may not be considered just conservatism; of course we do not want to go back to a limiting layout model, but we think that it is important to take into account the audience and its habits, even when they derive from different media (the printed page, in our case). The constant quest for innovation is important because it often allows to achieve results that were not possible before, due to the

physical limitations of the printed medium, or to improve a well-known way to access textual information. A good browsing tool makes it possible to examine all the available data from new points of view, and to make it easier for the user to connect different parts of the edition text. When an interface is too innovative, however, too much *outside the box* – or *outside the tradition*, in this case – it can obtain the opposite results: the scholar may feel confused, disoriented, and may not find what s/he is looking for, just because s/he does not know how to move in the edition s/he is reading, how the content is organized and how to find the desired information.

That is why it is very important to know the traditional layout of critical apparatus in printed editions, to be able to meet the users' expectations and to enhance and make as user-friendly as possible every single detail of the edition components that are going to be included in the final application. The UI of EVT is not completed yet, and in the future we will surely continue to add new features and implement support for other kinds of content. But the design and implementation will always follow the same path: sticking to the traditional methods when they allow viable and user-friendly solutions, at the same time enriching them in content and functionalities, and looking for innovative ways to take advantage of the digital medium.

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Encodings and Visualisations of Text Processes across Document Borders

Joshua Schäuble, with Hans Walter Gabler

Abstract

This essay exemplifies first inroads into interfacing a digitally born genetic edition (instanced by Virginia Woolf, “A Sketch of the Past” [1939–41; unfinished and fragmentary]). A basic requirement for digital genetic editing is to establish the records of text variation within individual documents and to concatenate these records in serial progression to trace and represent the genetic text processes across document borders. Coordinating the mark-up of revisional layering in individual documents within one encoding system establishes a synoptic record of the cross-document progression, stratified commonly into levels correlated to the carrier documents. Guidelines for genetic mark-up have been made available in the TEI P5v2 release. Their hands-on application to our sample material has resulted in some detailed critique and suggestions for modification. From capturing and marking-up the textual progression within each individual document of a series, we proceed to securing the continuity of the comprehensive digital record, and thus the permeability of the document border, by way of automatic collation and mark-up of the genetic text movements in the document interstice. The integrated digital record of a text progression across documents thereby effected carries in its mark-up the requisite information to visualise synoptically structured diachronic (genetic) text data under multiple perspectives. The interface visualisation as such must be realised through (sets of) visualisation software. From the construction-in-progress of one such set of modules, the essay demonstrates the design and describes the operation of one modular interface, a *Diachronic Slider*.

1 Introduction

Drafted writing in a single document or in a series of documents commonly goes through several stages of development. The document texts, in aggregate, bear witness to the textual genesis of the work. But a not inconsiderable amount of textual development happens *off the page*, as it were, in the rewriting of a document as clear, fair copy. The material evidence of the process of text development can be captured and represented – be it in the analogue of print, or through digital visualisation. Digital representation results from digital modelling of the genetic process as it is

materially evidenced and editorially and critically understood. This is the domain of scholarly editing – increasingly, of digital scholarly editing. When one emphasises textual development over the establishment of a critical text, this is digital genetic editing.

One requirement for digital genetic editing is to concatenate the record of text variation from a serial progression of documents. Each transition from one document to another marks a *border* in the materially traceable textual development. At each *document border*, the evidence for composition and revision is typically mixed: partly readable (and thus transcribable) from the materially extant documents, partly inferable only through critical assessment of the results of machine collation of document texts. Reading, transcribing, collating, and collation assessment need to be carried out in a constant interplay of digital automation and human (that is, critical) intervention. This constitutes the operative core of text-critical editing in the digital environment. The editorial assessments and decisions are modelled into the digital data through mark-up. From out of the genetically structured data, in turn, the visualisations to present the editorial perspectives are generated.

In this article, we describe the groundwork for unfolding the genetic development of textual progression *across* a document border. Our endeavour has been to fashion the digital record for Virginia Woolf's biography fragment "A Sketch of the Past" into the textual foundation for interface display and in-depth critical analysis. The diverse segments of this fragmentary writing exist as an incomplete set of draft manuscripts and a complete typescript. The typescript follows directly from the manuscript in the chain of textual transmission. The editorial practice described hereafter covers the computer-aided collation of these two documentary witnesses as well as the TEI encoding we developed to capture the textual genesis. Applying mark-up proposed by the TEI Guidelines hands-on to a specific task has naturally resulted in a many-faceted critique, with suggested modifications, of the guidelines. In a last subchapter, we discuss the benefits of encoding across the document border in order to derive dynamic visualisations.

2 Document collation with TUSTEP

Before processes of textual development across the document border can be encoded and visualised, they have to be critically assessed by a collation of the successive documents. "When there are two or more extant texts of a particular work or document, whether manuscript or printed, to collate them is to make a detailed comparison and to record systematically the differences between them" (Beal 79). For this process, the environment of the TUSTEP system of text-data processing was used.¹ At its

¹ A print introduction into TUSTEP Version 2016 is given by Ott and Schäkke.

core, a robust collation module runs collations over pairs of files. The operation parameters for each collation run may be fine-tuned by user specification, as for instance (generally): ‘collate natural-language content only; disregard (while keeping in place) all mark-up in angle brackets’; combined with (specifically): ‘collate segmentally by (user-specified) match-points’. The collation outputs the variation in lists ordered by base-file reference. These lists can, in their turn, be modified to user specification.

To implement a *genetic collation* across a document border, the first text stage (the first text layer – see below) of a succeeding document text is collated against the last stage (=layer) of the textual development in the document immediately preceding it. All revisions visible on that preceding document are included, identified by suitable mark-up. All revisions on the succeeding document that were added in post-fair copy writing campaigns are marked up but, for the purposes of collation, are excluded (i.e. temporarily filtered out). This ensures that earlier revision campaigns on the preceding document and later revisions on the succeeding document do not falsely get assigned to the inter-documentary level of text progression.

The TUSTEP system for text-data processing is deployed for collating the states-of-text defined by their respective carrier documents and for merging them into a representation of the genetic text progression across the document border. TUSTEP is modularly organised, and its modules stand in a cog-wheel correlation to one another. This gives the system a comprehensive capacity to deploy the results from the operation of one processing module (the collation) to achieve automatically, by means of an updating module (separate, yet correlated to the preceding collation through re-use of its machine-generated results as update instructions), a desired (and again at will user-defined) modification of data format and/or content: that is, to achieve the integrated text marked up for visualising the process of the text development.

This means more specifically: the modification-and-updating functionalities of the TUSTEP system concatenate, for Virginia Woolf’s “A Sketch of the Past”, the text’s manuscript-defined and typescript-defined levels so as to generate its genetic continuum in a fully marked-up XML-TEI P5v3.1.0 structuring. To this end, the list of the collation results is first rebuilt in terms of that data formatting. Text from the manuscript no longer present in the typescript gets automatically tagged as *deleted* in the transition from one document to the other. Reciprocally, text making its first appearance in the typescript gets tagged as *added* between the documents. Subsequently, the list of collation results so modified is used as the said instruction set to update a copy of the collation base file into a new composite file. In this composite file, text elements from the original base file and the original comparison file, already automatically tagged as they are with regard to their respective layer and level, are now also automatically merged. The merger represents the genetic manuscript-to-typescript text continuum of “A Sketch of the Past”.

3 Levels and layers: encoding textual features with genetic TEI

With the implementation of “An Encoding Model for Genetic Editions” (Burnard et al.) in TEI P5v2 (TEI Consortium, TEI P5v2 § 11), the TEI Guidelines introduced elements to encode authorial revision campaigns. Following the tradition of genetic editing, this model enables the encoding of the material traces that an author leaves on a document. The model thus implies a doubly-focussed diplomatic encoding, encompassing the entire range of patternings of inscription on the document, on the one hand, and specifically all inscription recognised and readable as text, on the other hand. So comprehensively understood, the Guidelines do not limit the usage of the proposed elements to text encoding correlated to one individual document only. We argue that this diplomatic model can be used to encode the textual development over a spread of successive documents without contradicting the Guideline’s current element descriptions (TEI Consortium, P5v3.1.0). The benefit of using the TEI model for genetic editions for inter-document encodings unfolds in its potential to derive dynamic visualisations and analyses of the textual genesis regardless of the physical documents. As opposed to an approach with a separate diplomatic encoding of each document, the critically assessed collation results are embedded in the mark-up and can be accessed and visualised without having to be constituted within the runtime of the user-interface (see subchapter “Visualisation Strategies”).

To describe sets or single instances of authorial changes, TEI P5v2 introduced the elements `tei:listChange` and `tei:change` as part of the `tei:creation` statement. The creation statement is used within the `tei:teiHeader` to encode “all information relating to the genesis or production of a text” (TEI Consortium, P5v3.1.0 § 11.7). Within the `tei:creation`, one or more `tei:listChange` elements can be used to compile “a number of change descriptions associated with either the creation of a source text or the revision of an encoded text” (ibid.). Consequently, `tei:listChange` does not only assemble revision campaigns within individual source documents, but also within the more abstracted source text. In our understanding, and particularly in the case of the extant “A Sketch of the Past” material, the source text spans contiguous documents of transmission. Accordingly, the change descriptions that get grouped by a `tei:listChange` need not be materially evident on only one document but can relate to (contiguously) successive documents.

The elements grouped by `tei:listChange` are themselves either `tei:listChange` elements, or `tei:change` elements. As opposed to the `tei:listChange` element, the `tei:change` element clearly refers to one source document: “`tei:change` documents a change or set of changes made during the production of a source document [...]” (TEI Consortium, P5v3.1.0 <change> ref).² A strict interpretation of the Guidelines

² Citations that are taken from a TEI-element’s reference-page are given by (TEI Consortium, P5v3.1.0

might argue that a revision campaign or “set of changes” performed in the author’s head in the act of transmission-turned-genesis between two documents cannot be described by using the `tei:change` element, because the grouped changes are not materially evidenced. But authorial changes, whether in material evidence on a source document or introduced silently in the act of text transfer from one document to another, always first arise in the author’s mind and then manifest themselves on a document. Thus, a set of authorial changes, that by critical analysis are recognisable and can be grouped as a revision campaign, is always “made during the production of a source document”.

The essential difference between sets of changes within a material document and across material documents is the way the individual changes themselves materialise and thus become identifiable. While revision campaigns within a document are visible on the document as interlinear additions, strike-through deletions, meta-mark transpositions and the like, the textual changes made in the act of text transmission across documents can only be traced by a critical analysis (or *Deutung*) of the textual collation (Zeller 55). Yet, this difference does not require separate TEI elements for revision campaigns within and across document borders, but rather calls for a consistent system of attributes to qualify the material evidence and the critical (i.e. editorial) certainty.

To categorise revision campaigns within documents and across document borders in terms of our project we rely on the distinction between textual *layers* and *levels*. Layers describe intra-document text stages: revisions made to a single document.³ In contrast to intra-document *layers*, *levels* designate distinct stages of text in, as well as between, one document and another. The application of this classification according to our encoding guidelines can be seen in the following TEI example for the fifth text segment of “A Sketch of the Past”:

`<elementname> ref).`

³ Within the range of our experience, the term *layer* is based on the HyperNietzsche Markup Language (HNML), an SGML-based standard that provided an `@lay` attribute to describe the intra-documentary textual development in stages (Saller; Zapf). The 1984 edition of *Ulysses – A Critical and Synoptic Edition* (ed. Hans Walter Gabler) in its turn deployed a proprietary (pre-SGML) mark-up system to synoptically encode both the changes on various documents of transmission and the intra-document *overlays* on each individual document.

```

<creation xml:id="creationInfo">
  <listChange ordered="true">
    <change n="1" status="draft" xml:id="ms_stage_0" type="level">
      <label>MS 1</label>
      <desc>Manuscript: Currente Calamo Additions and Deletions</desc>
    </change>
    <change n="2" status="draft" xml:id="ms_stage_1" type="layer">
      <label>MS 2</label>
      <desc>Manuscript: Overlay Additions and Deletions</desc>
    </change>
    <change n="3" status="draft"
      xml:id="ms_to_ts_transcription" type="level">
      <label>MS to TS</label>
      <desc>Typescript: Deletions, Additions and Substitutions that entered
        in the transcription process</desc> </change>
    <change n="4" status="draft" xml:id="ts_stage_1" type="layer">
      <label>TS 1</label>
      <desc>Typescript: Overlay Additions and Deletions</desc>
    </change>
  </listChange>
</creation>

```

We identify four stages of textual development and encode each one as a `tei:change` element. These stages are chronologically ordered and listed within a `tei:listChange`. Each individual textual alteration identified on and between the two extant witnesses is assigned to one of these stages.

The first stage is classified as a level, since it marks a new (the first) document stage. According to the editorial precept of strictly referring every written word on the document to a genetic text stage, the first textual draft inscribed on the manuscript surface (every word that is not linked to any other stage) is assigned to this level. This level also includes authorial alterations materially evident as *currente calamo* additions and deletions. These are changes made directly in the act of first writing and not as later revision changes of the given document text: “Such features usually characterize writing produced by an author in the throes of composition, with corrections or revisions made immediately rather than later” (Beal 104). The level is thus defined as the constitution of a new version of the text on a new document. Hence, the definition covers both first inscription including visible *currente calamo* corrections on any one given document, on the one hand, and the materially fresh inscription by (authorial) text transfer from one document to its successor, on the other hand, including the non-materialised mental text alterations in the process of text transfer from one document to the next, identifiable only by comparison through collation of the successive document texts.

The layer, as said, is strictly intra-documentary. The second `tei:change` element in the given example is categorised as a layer. It contains all alterations made by Virginia Woolf when she worked over the initial draft in a later revision campaign. Each textual change that is linked to this layer is an alteration visible on the source document but not identifiable as a *currente calamo* inscription. On the manuscript, distinguishing

between changes made directly in the first composition process and changes made in the same ink in the course of a later intra-documentary revision presents to the genetic editor a challenge of combined document-analytical and text-critical discernment.

The core of this article centres on a more complex instance of *level* encoding: the third *tei:change* element in the given example. It describes the textual development between the last stage of the manuscript and the first manifestation of the text (altered) on a new document, the typescript. Distinguishing layers and levels of text in the proposed mark-up system permits eliciting in *virtual materiality* the author's decisions to alter the text in her acts of transcription. Each textual difference between the manuscript and the typescript is encoded *as if* it was physically highlighted on the typescript. Thus, the text as physically witnessed by the typescript can be correlated seamlessly to the last text stage of the manuscript. Collating the two text stages yields the textual differences between them as a textual extract in two layers. This provides the virtually material substratum to answering the critical question "How does the author transform the text in her mind?".

To ensure a consistent encoding of the document transmission, it is necessary to develop rules for encoding that clearly describe both – the identifiable types of inter-documentary changes and how instances of each type are to be encoded. To explain this problematic ambiguity, we give a first example: When transcribing her own manuscript into a typescript (which she did herself), Virginia Woolf changed the phrase "my mothers [*sic*] name" (Woolf MS.A.5.b,3) to "my mothers [*sic*] laughing nickname" (Woolf TS.A.5.a,54). The change can be detected with the aid of collation software, but it is for the editor to interpret it and provide it with an adequate TEI encoding. It could be encoded as a single substitution of the word "name" with "laughing nickname" or as an addition of the word "laughing" followed by a substitution of "name" with "nickname". If we tokenise on a finer level of granularity than the word, it could even be encoded as a single addition of the string "laughing nick" that builds a new compound with the following invariant string "name". All these solutions, when applied, produce the correct text of the typescript, yet the critical editor must decide for herself which encoding best models the writing act as text revision and ensure that whatever representation is decided for this instance is applied consistently to all changes of the same type. The level of granularity and the applicability of given encodings to individual alterations might be questioned, but not the method as such of digitally generating an accurate integrated transcript of the text from a preceding document and the text as witnessed on its successor document.

To capture the editor's certainty about her mark-up decisions, the guidelines provide the element *tei:certainty* with the attribute *@locus="name"*. With the given value, the attribute "indicates [...] whether the correct element or attribute name has been used" (TEI Consortium, P5v3.1.0 <certainty> ref). Due to the wide range of possible encodings for individual changes, such a certainty indication cannot be given for an

entire revision campaign. Instead, it can be encoded for types of alterations regardless of the layer or level they appear on, as well as for single instances of authorial alterations.

A similar problem arises with the encoding of the material evidence of a change. Per our differentiation, both *currente calamo* corrections that are materially evident on one document and changes that happen between the documents are comprised within *levels*. Therefore, the material evidence is not the same for all changes that are grouped under a level. Yet, both the *currente calamo* corrections and materially undocumented textual transformation in the author's head happen immediately in the act of inscription/typing and therefore rightly belong to the respective level of textual development. In other words, there is no predetermined correlation between a *level* alteration and its material evidence. In contrast, for changes that are classified as belonging to a *layer* by *tei:change* with the attribute *@type="layer"*, the encoding of the material evidence is redundant, since they are – by the definition of the *layer* – all materially evident on the respective source document.

4 Classification and certainty of inter-documentary alterations

The types of textual alteration that occur in the process of transmission from one document to another do not significantly differ from those that can be identified from intra-documentary revision campaigns. What differs is the degree of certainty about which type to choose for a given alteration. In the case of “A Sketch of the Past”, the number of individual instances to be subsumed under a given type is significantly higher than on any other level or layer. In the act of typing her own manuscript, Woolf breaks away from the physical limits of the paper. In her head, she transforms the text more strikingly than it would be possible on the document. Nevertheless, she never completely loses the connection to the previous document. She carefully detaches text unit after text unit from her own manuscript, reworks the text in her mind and secures the result by typing it onto a new document. Revising such units, she omits words that she considers unsuitable, substitutes entire segments with alternative wordings and adds new phrases that enrich and further develop the previous version. Yet in no case does she completely discard the well-considered narrative of the earlier manuscript; her changes are embellishments and accretions rather than major departures.

Consequently, corresponding text units can be identified on both the typescript and the manuscript. By giving the starting points of these corresponding units on both documents, the TUSTEP collation algorithm can be manually realigned. This critical interaction with the collation software guarantees that an encoding of the textual development can always be achieved on a finer level of granularity than by way of

separate document transcripts. Even in the highly unlikely case that the collation algorithm cannot identify any further similarities or differences between two aligned text units, the corresponding text spans can still be encoded as single wide-ranging substitutions or variant readings. What this means is that a widely variant text unit will not confound collation of subsequent units. For the collation of the two extant “A Sketch of the Past” witnesses, this scenario of failing collation alignment does not occur. Instead, the collation across the document border succeeded in detecting more omissions, additions and substitutions in the text’s genetic progression than at any other stage of the textual development. In other words, the act of fair copying is as creative and integral a phase of composition as further elaborating and revising that clean copy.

Although all inter-documentary alterations are verifiable by a comparison of the texts from the two consecutive witnesses, the moment of entry might be contested. One might dispute the immediate contiguity of the two extant documents by arguing for a missing intermediary document. Also, one might argue that in any case the two documents should not be considered in a relationship of textual development but should rather be seen as variant readings related collaterally. This perspective cannot be rejected out of hand. After critical assessment of the textual differences, however, there can be no doubt that the typescript text is a more advanced version of the text in the manuscript. The typescript text was produced in a linear workflow from the manuscript to the typescript and not as a collateral recasting of the text evidenced in the manuscript. With this critical insight, an encoding of every alteration as a collateral reading of equal validity, though theoretically possible, would give little insight into the textual development and the creative process taking place in the author’s head. At the same time, however, it is also true that Virginia Woolf abandoned her project of “A Sketch of the Past” before arriving at a final version and approving it for publication. By reconstructing and visualising simply the genetic progress of her writing from manuscript to typescript, we make no claims for authorial preference nor do we imply a final authorial decision.

4.1 Additions

Together with the deletion, the addition is the simplest case of a textual alteration in the process of rewriting. Figure 1 gives an example of an inter-documentary addition between the manuscript and the typescript. The figure contrasts the manuscript and the typescript. Both image fragments show the first paragraph of the fifth text segment, in which Woolf sketches her memories of her half-sister Stella Duckworth, who died in 1897 at the age of 28 (McCracken 72–73).

In this, the first paragraph of the “Sketch”, Woolf describes *the act of remembering* as a frame narrative embedding the actual memory. For the author, the act of

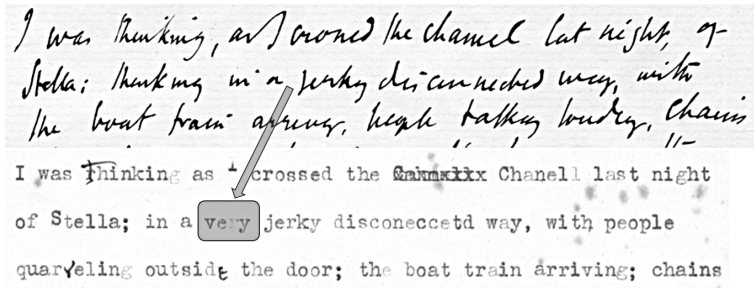


Figure 1: An addition in the text transmission. Top: MS.A.5.b,1 and bottom: TS.A.5.a,52.

remembering itself embodies a valuable and vivid memory that connects the past to the present. Neither the moment in time nor the circumstances are arbitrary as both the manuscript and the typescript are dated “June 20th 1939”, although the latter might have been produced a couple of days later. The frame narrative is not replaced during the revision – which bears yet another act of remembering – but instead it is emphasised by textual alterations such as the simple addition of the word “very”. The TEI we use for such instances looks as follows:

```
[...]in a
  <add change="#ms_to_ts_transcription" evidence="collation">
    very
  </add>
jerky[...]
```

A `tei:add` element is linked to the corresponding inter-documentary level (`tei:change`) with the attribute `xml:id="ms_to_ts_transcription"`, which is described in the `tei:creation` statement in the header. To distinguish between instant changes evident on the paper (like the instant correction of the still mistyped word “Chanell” in the first typescript line of figure 1) and those silently introduced *between the documents*, the attribute `@evidence` is used with one of the two values “collation” or “document”. We thus extend the value options for the attribute rather than adopting the values “internal” / “external” as proposed by the guidelines. These, by implication, already support editorial decisions towards establishing critical texts. The values “collation” / “document”, by contrast, merely record the attribute `@evidence` for the textual genesis without prejudicing subsequent critical editorial evaluation.

Further attributes, like the attribute class `att.global.responsibility` have been considered, which allow the editor to indicate “the agent responsible for some aspect of the text, the mark-up or something asserted by the mark-up, and the degree of certainty associated with it” (TEI Consortium, P5v3.1.0 `att.global.responsibility`). For

all inter-documentary changes with the attribute `@evidence="collation"`, this responsibility is shared between the author (Woolf, who introduced the addition) and the critical editor (Gabler, who elicited it with the aid of the collation tool). We thus consider the `@evidence="collation"` attribute to imply an indication of responsibility and do not encode *responsibility* explicitly for every single instance.

4.2 Deletions (omissions)

Deletions are encoded in analogy to additions. In the text segment displayed in figure 1, Woolf changed the phrase “thinking in a jerky disconnected way” (manuscript) to “in a very jerky disconeccted [*sic*] way” (typescript). She not only adds the word “very” but also omits the word “thinking” at the beginning of the phrase. We encode this omission as follows:

```
[...]Stella;
  <del type="omission" change="#ms_to_ts_transcription" evidence="collation">
    thinking
  </del>
  in a [...]
```

While the encoding is self-explanatory, our decision to use the `tei:del` element for deletions between two documents may be questioned. The underlying problem is the definitional difference between a deletion and an omission. For deletions, the guidelines note:

There is a clear distinction in the TEI between `del [...]` on the one hand and `gap [...]` on the other. `del` indicates a deletion present in the source being transcribed, which states the author’s or a later scribe’s intent to cancel or remove text. [...] `gap` or `unclear`, by contrast, signal an editor’s or encoder’s decision to omit something or their inability to read the source text. (TEI Consortium, P5v3.1.0 `` ref)

This guideline demands evidence on the source document for the `tei:del` element. The authorial decision to omit text might therefore perhaps better be encoded with the `tei:gap` element. Yet, `tei:gap` is intended to encode illegible text or empty spaces (placeholders) within a document as “an editor’s or encoder’s decision” (ibid.). Consequently, the `tei:gap` element does not allow text content. From a document-centred perspective it is an oxymoron to encode the textual content of a gap or omission: text cannot be legible and omitted at the same time. Across the document border, however, this is perfectly possible. Neither `tei:del` nor `tei:gap` were initially intended to encode the textual development across a document border, but if one chooses to encode in this fashion, `tei:del` is the better fit. To us, a fall back on the generic `tei:mod` element or even a self-defined omission-element outside the TEI namespace does not seem necessary. The reason for the guidelines’ “clear distinction” is to ensure

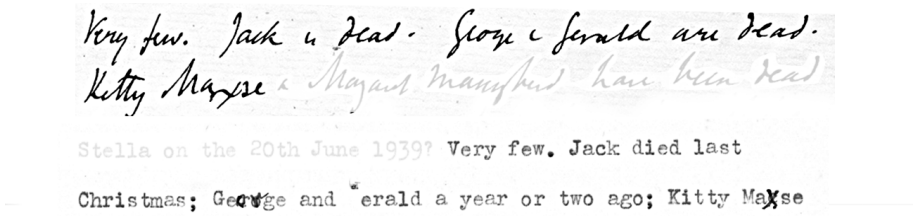


Figure 2: Substitutions across the document border. Top: MS.A.5.b,1 and bottom: TS.A.5.a,52.

the differentiation between intra-documentary phenomena. The possibility of an inter-documentary deletion was simply not considered.

4.3 Substitutions

Within a document – so on a layer or intra-document text stage – substitutions are visible as the cancellation of one phrase and its replacement by another. Both components, the cancelled phrase and its substitute, are materially evidenced on the same document, be it in the form of overwriting, an interlinear addition, a note in the margin or similar. Substitutions across the document border are, by contrast, highlighted on neither document. Only an alignment and comparison of variant and invariant textual units can render them visible.

Figure 2 compares the two witnesses for another fragment of the fifth text segment. Woolf is still reflecting on the circumstances that caused her to remember her half-sister Stella. She answers the rhetorical question “How many people are there still able to think about Stella on the 20th June 1939?” (typescript), by listing friends who, like Stella, are already dead. The manuscript reads “Jack is dead. George and Gerald are dead.”, which on the typescript reads “Jack died last Christmas; George and Gerald a year or two ago;”. Although the two versions are very similar, the typescript represents a slightly more detailed textual state. The motivation for the textual changes between the manuscript and the typescript is the same as for the addition in figure 1. In the act of transcription, Woolf enriches the text with further information. She distinctly substitutes two phrases to date the deaths of Jack and of her two half-brothers, which were before only listed in the manuscript.

To understand how substitutions are detected by a collation algorithm, an alignment of the variant and invariant text units of the manuscript and the typescript is helpful. Table 1 shows the substitutions as an alternation of invariant and variant text segments. The inter-documentary substitution is the combination of an inter-documentary omission and an addition, framed by invariant text. The surrounding invariant text (identical in both witnesses) defines the borders of the substituted text.

Invariant	Variant	Invariant	Variant	Invariant
MS: Very few. Jack	is dead.	George and Gerald	are dead.	Kitty [...]
TS: Very few. Jack	died last Christmas;	George and Gerald	a year or two ago;	Kitty [...]

Table 1: Inter-documentary substitutions as alternations between invariant and variant text.

A conservative TEI encoding would capture these instances as different readings (`tei:rdg`) of a textual variation within an apparatus structure. Since the emphasis here is not on the variation, but on the textual development, this was not an option. Instead, two inter-documentary substitutions are encoded. The phrase “is dead.” is substituted by “died last Christmas;” and the phrase “are dead.” is substituted by “a year or two ago;”. In TEI this is encoded as follows:

```
Very few. Jack
  <subst change="#ms_to_ts_transcription" evidence="collation">
    <del>is dead. </del>
    <add>died last Christmas; </add>
  </subst>
George and Gerald
  <subst change="#ms_to_ts_transcription" evidence="collation">
    <del>are dead. </del>
    <add>a year or two ago; </add>
  </subst>
Kitty [...]
```

The level-reference has to be captured only for the `tei:subst` element. The `tei:del` and `tei:add` elements inherit this information, if no deviating revision campaign is assigned. If the added text gets modified again at a later text stage, this can be nested within the `tei:add` as encountered on the typescript. To differentiate between a substitution that is physically verifiable on the document and an inter-documentary substitution, the `@evidence` attribute is used again. If the attribute is set to “collation”, the substitution is not visible on the witnesses and if it is set to “document”, it is a *currente calamo* substitution that is visible on the typescript (the target document of a level definition). The latter case is usually qualified by further attributes such as `@rendition="overwritten"`, to capture the type of documentary evidence.

To produce a transcript of a selected text stage, the processing software for each substitution iterates chronologically over all encoded text stages. For substitutions that happened before the selected text stage, the deleted text is hidden and the added text is shown, and for substitutions that happened on or after the selected text stage, the deleted text is shown and the added text is hidden. The `@change` attribute acts as a switch between the nested `tei:del` and `tei:add`. It controls which text is considered before and after the assigned revision campaign.

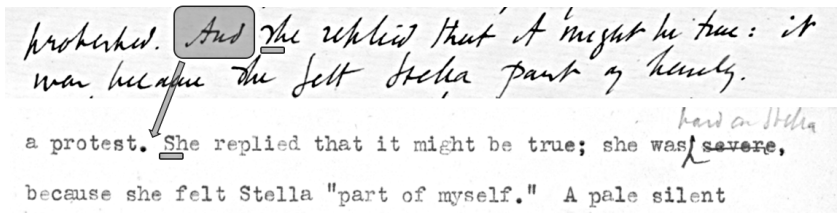


Figure 3: Omissions at the beginning of a sentence are encoded as substitutions.

Invariant	Variant	Invariant	Variant	Variant	Invariant
MS:	. And she	replied that it might be true	:	it was	because [...]
TS:	. She	replied that it might be true	;	she was severe,	because [...]

Table 2: Collation alignment of a deletion at the beginning of a sentence.

For the collation algorithm, we tokenise and compare the textual transcripts at the word level. The comparison is case-sensitive. Inter-documentary additions and deletions at the beginning of a sentence often require changing the capitalisation of the succeeding word. Consequently, they are detected and encoded as substitutions. Figure 3 shows an instance of a deletion across the document border that affects the capitalisation of the succeeding word. With the omission of the capitalised “And” in the typescript, the succeeding “she” becomes the first word of the sentence and must be capitalised.

Again, a tabular collation alignment helps to comprehend the computational assessment of the textual development between the two documents (see Table 2). Since the TUSTEP collation algorithm is set to compare textual units at the word level and to distinguish capitalised from uncapitalised words, the words “she” and “She” are not assigned to the invariant succeeding phrase “replied that it might be true”, but to the variant segment before. Therefore “And she” gets substituted by “She”. By manual editorial intervention, such instances could alternatively be encoded with an inter-documentary deletion (here of the word “And”) followed by a substitution of the following word with its capitalised variant (here “she” with “She”). We opted for the more straight-forward encoding of a single substitution, which does not demand manual intervention.

A vigilant reader of Table 2 might detect inconsistencies in the second and third variant column. First – and this is an automatable decision – the preceding variant punctuation was separated and encoded as an individual substitution. This is simply because it does not semantically belong to the following unit. The more interesting

intervention is in the third variant column. Here the aligned text fragments “it was” and “she was severe,” both contain the invariant word “was” and should therefore be split into three columns. The string “it” would then be substituted by the string “she”, the word “was” would be invariant in both document texts, and “severe” followed by a comma would become an inter-documentary addition. Here the table does not reflect the TUSTEP collation result, but a manual editorial intervention. Although the verb “was” is invariant, in the typescript it refers to a different grammatical subject. The authorial writing act was clearly aimed at replacing the whole clause as one cohesive alteration. This instance is a good example of the necessity of critically assessing the collation results. This assessment will lead to either affirmation of the collation output or manual editorial intervention.

4.4 Transpositions

Although transpositions are relatively common in authorial source documents, for a long time there was no applicable encoding model to represent them computationally. A transposition on a source document consists of one or more segments within the text that are marked by the author – whether with arrows, numbers, or any other *metamark* – to indicate that they should be reordered or moved to another position in the act of textual transfer. A model to encode transpositions must be able to represent the text before the transposition is applied, the text segments to be transposed, the metamarks that indicate the transposition and which segment they relate to and, finally, the target of each segment or *where in the text the segment is meant to move*.

With the integration of a model for genetic editing (Burnard et al.) into the P5v2 release of the guidelines, the Text Encoding Initiative provided elements that fulfilled the requirements for handling transpositions. To flag the text spans that are to be transposed, the guidelines provide the generic `tei:seg` element that can be qualified with the attribute `@function="transposition"`. To be recognisable, each segment gets assigned a unique identifier (`@xml:id`). The author’s metamarks (arrows, numbers, lines) that indicate the transposition on the document can be encoded with the element `tei:metamark`. A metamark “contains or describes any kind of graphic or written signal within a document [...] to determine how it should be read rather than forming part of the actual content of the document” (TEI Consortium, P5v3 <metamark> ref). These metamarks are linked to the `@xml:id` of the text segments they are meant to reorder. To describe how the flagged text segments are reordered, the guidelines provide two elements: `tei:listTranspose`, which “supplies a list of transpositions, each of which is indicated at some point in a document typically by means of metamarks” (TEI Consortium P5v3 § 11.3.4.5), and `tei:transpose`, which “describes a single textual transposition as an ordered list of at least two pointers specifying the order in which the elements indicated should be re-combined” (ibid.).

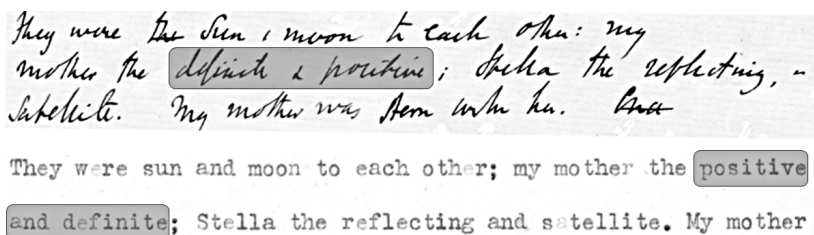


Figure 4: An inter-documentary transposition Top: MS.A.5.b,2 and bottom: TS.A.5.a,53.

These encoding guidelines as part of the model for genetic editing are clearly focused on diplomatic encoding. They answer to transpositions visibly indicated on the document, “typically by means of metamarks” (ibid.). Yet, the `tei:metamark` is not necessary to give an alternative order to addressable text segments within a `tei:transpose` element. If there are no metamarks to be encoded, e.g. because the transposition was not indicated but silently executed in the process of transcribing text from one document to another, the transposition can still be captured.

Figure 4 shows an example of a simple inter-documentary transposition. Here, Woolf describes the opposing characters of her mother and her half-sister Stella. Each one is characterised with two contrastive adjectives: “They were Sun and moon to each other: my mother the definite and positive; Stella the reflecting, & satellite.” (MS.A.5.b,2). The grammatical structure of the sentence emphasises the celestial metaphor. The sun is aligned with her mother and the adjectives “definite and positive”, the moon with her sister and the adjectives “reflecting, & satellite”. When typing her own manuscript, Woolf realises that this clear alignment conflicts with the word order: the sentence is structured in parallelisms and yet the adjectives build a chiasmus. To correct this, she must change the order of one pair – only then “positive” opposes “reflecting” and “definite” opposes “satellite”. She realises the mistake and without indicating it on the manuscript, rearranges the word order in the process of typing.

Simple movements of text can be detected by comparing additions and deletions across the document border. If a deletion and an addition, both occurring on the same level and within a reasonable textual distance from one another, contain the same text, they likely represent an instance of transposed text units – a textual shift. More complex transpositions can be detected by comparing substitutions. If two or more substitutions contain the same text, but reversed (i.e. the deleted text of one substitution is the added text of another substitution and vice versa), they are likely to be a single transposition of two or more text units – a rearrangement. The latter case can be observed when looking at a collation table for the previous example (see

Invariant	Variant	Invariant	Variant	Invariant
MS: [...]: my mother the	definite	and	positive	; Stella the reflecting and satellite [...]
TS: [...]: my mother the	positive	and	definite	; Stella the reflecting and satellite [...]

Table 3: Collation alignment of a transposition.

Table 3). Normally, we encode such alternating occurrences of invariant and variant text as a substitution: “definite” is substituted by “positive” and “positive” is substituted by “definite”. Since the deletion within the first substitution is identical to the addition within the second, and vice versa, this is a strong indicator of a transposition.

We encode inter-documentary transpositions identically to the guidelines’ proposed encoding for intra-document transpositions, with only the one difference that there are no metamarks to be encoded for, or referred to, the transposed text units. A TEI encoding for the instance of Table 3 looks as follows:

```
<seg xml:id="transp_sg5_3" function="transposition" n="1">definite</seg>
and
<seg xml:id="transp_sg5_4" function="transposition" n="2">positive</seg>
<listTranspose>
  <!-- previous transpositions... -->
  <transpose change="#ms_to_ts_transcription">
    <ptr target="#transp_sg5_4"/>
    <ptr target="#transp_sg5_3"/>
  </transpose>
  <!-- following transpositions... -->
</listTranspose>
```

The two transposed words are encoded as `tei:seg` elements with the specifying attribute `@function="transposition"`. In a `tei:listTranspose` element, the further specifications of all transpositions are listed for the complete text segment. Each transposition is here encoded with a `tei:transpose` element. The `@change` attribute on this element defines the level on which the transposition is executed. Nested within the `tei:transpose` elements are so-called pointers determining the order of the text segments after transposition. Here, the pointers can be read as follows: move the segment with the `xml:id="transp_sg5_4"` to the position of the first element of the current set. Then move the element with the `xml:id="transp_sg5_3"` to the position of the second element of the current set. The order of the `tei:ptr` elements specifies to which position of the previous order each element is transposed. By this proposed solution, the guidelines should successfully direct encoding related transpositions of multiple (more than two) elements.

This mode of encoding however involves a small technical difficulty. The TEI Guidelines never considered using this encoding to derive the text after transposition. Their only aim was to capture the indication of a transposition as it is visible on a

document: “By definition the result of a transposition is not present in the document, and should not therefore be encoded, if the intention is to represent the actual appearance of the document” (TEI Consortium, P5v3 § 11.3.4.5). If one nevertheless wants to design software to generate the transposition according to a new (revised) ordering given in the `tei:transpose` element, the difficulty met is that the `tei:transpose` element *only* contains information about the new order of the participating text segments, but not about the order witnessed by the document (*old order*). There is no explicit information given to tell the software which one of the participating segments is the first on the document. While a human reader might say: “it is simply the one that appears first in the text”, software does not retrieve this information without analysing the text. What sounds complicated, is very easily solved, simply by ensuring that each segment of a transposition set accessed by the software knows its own relative position within the set. To achieve this, we have added the `@n` attribute to each `tei:seg` segment⁴ (see encoding sample above).

4.5 Mixed Types

For “A Sketch of the Past”, most instances of transposition across the manuscript-to-typescript border are not as neat as the previous example. In any case, they must be confirmed by a critical editor and in the majority of cases they are detected by comparative scrutiny of the material documents in the first place. This is because Woolf not only transposes units, but at the same time also revises parts of the text substituted in the transposition. Figure 5 shows an instance of such a mixed-type transposition:

This final example brings us back to the first paragraph of the fifth segment, which was already used to explain additions (see figure 1). All the inter-documentary changes in this paragraph are motivated by the same idea. Woolf enriches the frame narrative about the distracting circumstances that made her remember her half-sister Stella. When typing her own manuscript, she wants to emphasise her “very [addition!] jerky disconnected way” of thinking. To do so she substitutes the phrase “people talking loudly,” by “people quar_eling [*sic*] outside the door;” (with the word “people” left invariant). *Quarrelling* is a stronger, more distracting action than *talking loudly*. It implies tension and a conflict and is therefore a more distinct irritant to induce her disconnected, conflicting memories than just loud talking. For Woolf, this substitution is not quite sufficient to express the close link between her disconnected thinking and the surrounding noise. She also expresses this closeness in the word order, transposing “the boat train arriving” by “people quar_eling outside the door”. The latter is now

⁴ An alternative solution to locate each pointer’s previous position is to parse over all pointers, look up the absolute position of the respective segment in the text – e.g. by using the XSLT `position()` function – and then to sort the results. Yet this solution seems needlessly complicated.

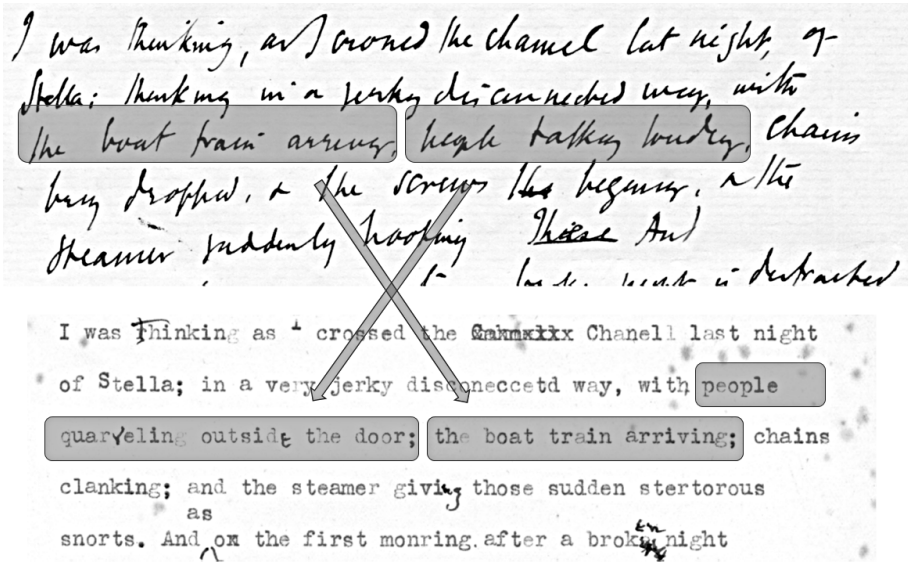


Figure 5: Mixed Types: A transposition of substituted text revised.

in direct succession to “thinking [...] in a very jerky disconnected way” and the first phrase connects better to the following description of chain noises, which aurally probably accompany “the boat train arriving”.

We encode this as a transposed substitution. Effectively this encoding establishes regular inter-documentary substitutions as described above, nested within text segments that are part of a transposition. Note that both transposed text segments contain a substitution, because the punctuation was changed from commas to semicolons:⁵

```
<seg xml:id="transp_sg5_1" function="transposition" n="1">
  the boat train arriving
  <subst ...><del>, </del><add>; </add></subst>
</seg>
<seg xml:id="transp_sg5_2" function="transposition" n="2">
  people
  <subst change="#ms_to_ts_transcription" evidence="collation">
    <del>talking loudly, </del>
    <add>quarreling outside the door; </add>
  </subst>
</seg>
```

⁵ To keep the code example more legible, the level attributes of the punctuation substitution were omitted. Also, the handwritten addition of the letter “r” within the word “quar_eling” on the transcript is emended to simplify the example for the article.

```
<listTranspose>
  <transpose change="#ms_to_ts_transcription">
    <ptr target="#transp_sg5_2"/>
    <ptr target="#transp_sg5_1"/>
  </transpose>
</listTranspose>
```

Computationally, such instances are difficult to detect. Table 4 shows one possible result of a computational collation. A good algorithm detects the biggest invariant string, which is the phrase “the boat train arriving”. The transposed “people quar_eling outside the door;” therefore has no corresponding text on the manuscript and is falsely encoded as an addition between the documents. The last part “, people talking loudly,” aligns as variant text with a semicolon before the next invariant text (“chains”, see figure 5).

	Addition	Invariant	Variant → Substitution
MS:		the boat train arriving	, people talking loudly,
TS:	people quar_eling outside the door;	the boat train arriving	;

Table 4: Collation alignment of a mixed type.

If we accepted this collation result, the instance would be encoded as an addition, followed by invariant text, followed by a substitution. Yet this by no means captures the author’s assumed motivation for the set of text changes. The instance can so far only be detected as a transposition by critical scrutiny of the collation.

5 Visualisation strategies: an eXist-db based user interface

The main benefit of an inter-documentary encoding is its potential as seed-bed for dynamic visualisation. With this encoding, all the critically assessed collation results are present in a single TEI file and can be dynamically accessed for analysis and visualisation within a single user interface. It is not necessary to implement further collation algorithms at the backend to derive collation views of successive documents. At the same time, both a diplomatic and a textual transcript of every single text-stage can be dynamically reconstructed within the runtime of the user interface.

To provide a user interface for a digital edition of the encoded “A Sketch of the Past” material, we are developing a modularised eXist-db application. Figure 6 schematically visualises the backend design of this environment. Synchronous and asynchronous HTTP-requests are sent from the user to the eXist-db controller on the server. A sample request in natural language could be: “show me a textual (or diplomatic) visualisation of the first typescript layer of segment five”. The XQuery-based controller

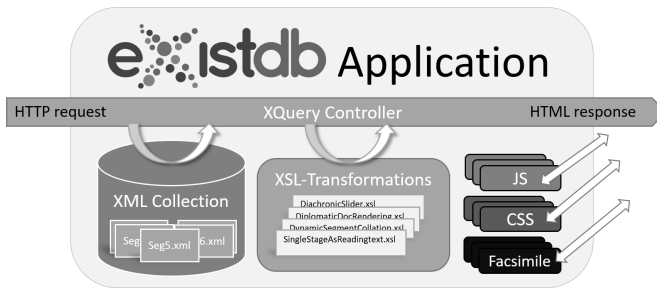


Figure 6: Simplified Controller Schema of the eXist-db Backend.

processes such requests. It first takes the requested TEI file (or parts of it) from the respective XML collection. Then an appropriate XSL-file is selected from a set of different possible scenarios, containing transformation templates to produce the requested visualisation. The integrated XSLT processor transforms the TEI contents according to the defined XSLT templates into an HTML output with references to CSS definitions and JavaScript libraries for dynamic browser functionalities and asynchronous AJAX requests. Finally, the resulting HTTP response (HTML including JavaScript, CSS and images, i.e. facsimiles) is sent to the client for display in a browser.

With this design, we approach a system-independent reusability of the individual XSLT transformations. Although all transformations could also be achieved using XQuery (and some simple asynchronous calls are indeed processed this way), XSLT allows the extraction of single modules from the eXist-db environment and their reusability in other environments.⁶ On the other hand, existing XSLT stylesheets, such as those provided by the TEI (see Rahtz), can be plugged into a transformation chain. For example, in a first transformation, a more common TEI encoding (diplomatic or textual) confined to, and valid for, one single document (that is: the *intra-document* encoding for that given document) may be derived from the proposed document-embracing encoding. Such encodings specific to individual documents could then, in turn, be queued into an XSLT stylesheet provided by the TEI to produce a generic visualisation – though such a procedure would lose the text-genetic focus realisable through continuous mark-up of text progression across document borders which, as discussed above, may be generated from processing the results from collation of the textual states of contiguous documents.

While the application is still under development, some first modules have already been implemented. Two of these modules, the basic diachronic text viewer and what

⁶ The basic prerequisite to reuse these XSLT stylesheets is of course a TEI encoding structured as described in this article.

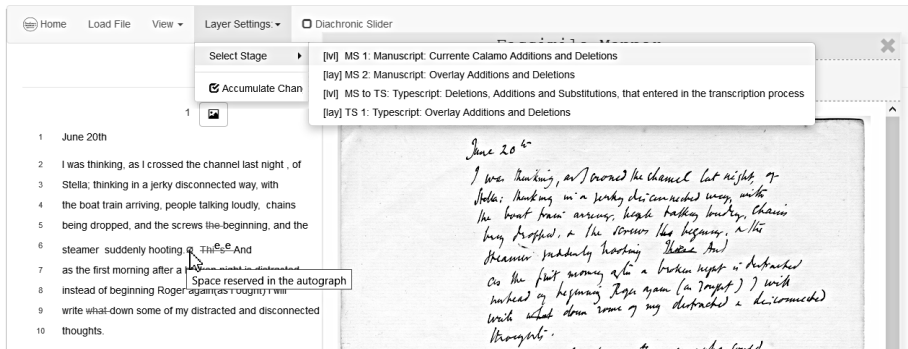


Figure 7: User Interface: Basic Text View.

we call the *Diachronic Slider*, will be introduced here to demonstrate the advantages of an inter-documentary TEI encoding.

Figure 7 shows a screenshot of the basic text viewer opened to the beginning of segment 5; it displays the same paragraph of Woolf's "A Sketch of the Past" we have used above to explain the different types of alterations discernible between documents. For each encoded page, the corresponding facsimile can be loaded into a scalable and draggable window by clicking on the facsimile symbol that precedes the page transcription. The image is loaded by an asynchronous call from the server.

In the current version, the user can select a text stage in the main menu and the changes of the corresponding *layer* or *level* are dynamically switched on or off in the transcript – without the text being reloaded from the server. Both the description and the order of the single text stages in this selection menu are taken from the `tei:listChange` element in the `tei:creation` statement (see the example code above). In the given example, the first text stage "MS 1: Manuscript: Currente Calamo Additions and Deletions" is selected.

The user can choose in the *Layer Settings*, whether she wants to display all layer- and-level changes accumulated on previous and the current document or only those of the document carrying the currently selected *layer*. At any given layer visualisation, changes that happened on previous *layers* and *levels* are shown in grey. Alterations at the selected stage are colour-coded with red plus strike-through for deletions, green for additions, superscripted plus green for substitutions and blue arrow-marks for transpositions. (This palette of colour indications is, of course, not reproduced in our black and white figures.) For various TEI elements, furthermore, mouse-over information is derived from the encoding; e.g., in line 6 a gap is encoded and commented with "Space reserved in the autograph" (see figure 7). Subsequent development will



Figure 8: User Interface: Diachronic Slider.

see synchronised highlighting of a selected line of text on both the transcript and the facsimile.

Figure 8 shows the *Diachronic Slider*, a tool that demonstrates the dynamic potential of a genetic encoding across the document border. It visualises the textual development of a user-selected text range by successively displaying each of the different stages.⁷ When the user selects the button *Diachronic Slider* in the main menu, a new scalable overlay window opens. All modularised interface tools open in such windows. If the contents (text, metadata, images) a tool requires are not already included in the base text, the respective information is requested from the server and displayed in a tool sub-window. These requests are realised as asynchronous AJAX calls in the background. By this design contents are produced on demand on the server by the application of XSLT stylesheets on TEI documents. The results are seamlessly included into the frontend without interrupting the user's workflow by reloads of the complete page.

When the *Diachronic Slider* is first opened, the window is empty and the user is advised to click on the *Select* button in the slider's icon bar (figure 8). On clicking, the button turns grey and the mouse cursor changes into a paint brush to signal that the application is now in the marking mode. With the brush, the user selects and marks a text span in the main text area at will (avoiding only to set beginning or end into the middle of a textual alteration). Although additions on later stages and deletions on earlier stages are not visible in the display of the base text, the encoding of all

⁷ The tool development is influenced by Julie André's and Elena Pierazzo's interface-prototype for the genetic visualization of a Marcel Proust notebook (André and Pierazzo). Pierazzo emphasizes "how crucial is transiency (or time-based animation) in the case of genetic editions; this function could well represent the key factor in making digital editions worth pursuing for genetic editing" (Pierazzo 35).

alterations over all *layers* and *levels* is present in the linear succession of the text. Text segments invisible on the screen are not deleted at the back-end; their HTML representation in the browser is simply hidden by a dynamic JavaScript function. The marked text span which usually breaks the strictly tree-based *document object model* can be restored to build a correctly nested subtree which is passed to the *Diachronic Slider*, including all alterations at all text stages.

Immediately on release of the mouse click, the subtree that represents the selected text is copied once for each text stage. A visual textual representation of each stage is constructed: for each copy of the subtree, all alterations *until* the current text stage are applied. Previous deletions are struck through, future deletions are shown as normal text; previous additions are switched to *visible* and future additions are *hidden* (and so on). The results are mounted to the slider window. Figure 9 shows the same slider selection as figure 8 for two different states (top and bottom). All available text stages can be selected by clicking on the labels in the slider's icon bar. On *mouse over*, the labels are extended with little tooltips that contain the corresponding *tei*:change description from the metadata.

The top window in figure 9 shows the selected lines on the stage “MS1”, the first manuscript version. When the user clicks on the label “MS to TS” in the icon menu, the text of the inter-documentary *level* slides in on the centre of the split-screen window from the right side until it fully covers the previous text (result: figure 9, bottom). The sliding direction signals the chronology. A slide from the right-side signals that a later text stage was selected and a slide from the left-side signals a preceding stage.⁸ Directly underneath the central sliding part of the window is a static text version enabling eye-collation of the two parallel window parts. This static text is an identical copy of the initially selected base text. By changing the text stage in the main window before the slider is brought into the marking mode (main menu: Layer Settings → Select Stage), the static collation level can be set to the user's requirement. Note that figure 9 visualises the complex mixed-type transposition shown in figure 5. In the top state, the text is not transposed, while in the bottom state the two segments are swapped and marked as transposed with little arrows. A further highlighting of transpositions e.g. by an animation of the swap, may be considered at a later stage of the tool's development.

⁸ The dynamic appeal of this tool is difficult to describe and cannot be revealed by static screenshots on printed paper. The animation of the changing text stages can hardly be captured in this article. A live demo can be accessed via www.compositiongenetics.org.

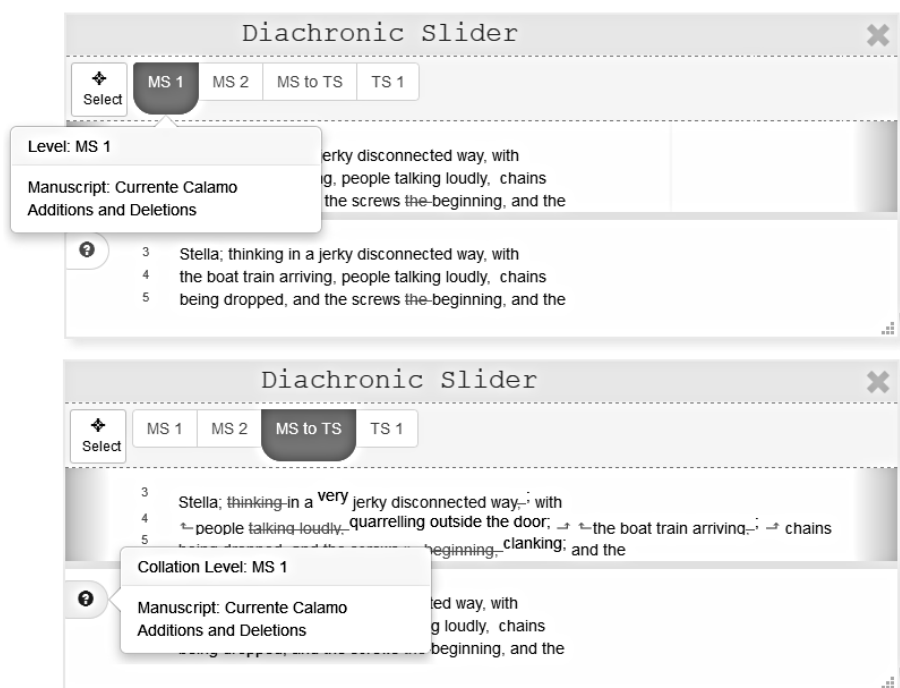


Figure 9: *Diachronic Slider* in two states. Top: first manuscript stage; Bottom: inter-document level.

6 Conclusion

Concluding a survey of work-in-progress means looking ahead. What we hope to have drawn attention to is that, while in the common situation of creative writing extending over sequences of documents the material evidence of the genesis of texts resides in individual documents, the text in the total development of its articulation and alteration in writing progresses across document borders. Capturing this fundamental textual condition digitally requires understanding, response and solutions beyond the attempts already made (e.g., by the TEI Consortium) to instigate conventions for analysing and marking-up many-layered writing in and on documents. Aids to standardisation have hitherto been focussed on use cases related to the individual document. Our proposition here has been how to deal with text genetics extending over sequences of documents: first, how to capture and pre-structure the material givens for intra-document and inter-document text progression; second, how, by means of automatic collation, to stratify the digital record of the material states-of-

text; third, how analytically and interpretatively to determine as layers and levels the stratifications elicited from the collation; fourth, to devise a differentiated mark-up to label the layers and levels and so render them retrievable according to their every analytical perspective encoded in the mark-up; and fifth, to devise dynamic modules for visualisation of the dynamic text progression so encoded. The analysis, structuring, and consequent mark-up amount to, and achieve, a ‘synoptic’ digital perception of a text progression across documents. Hence, visualisation operations linking into the synopsis record need not contend with, by preliminary coordinating, divergent document-specific encodings. Instead, all data from which to generate visualisations are already in one place in one comprehensively structured archival pool. How this can be utilised to advantage and ease, we have here demonstrated from the design and use of the *Diachronic Slider* tool. Developed in tandem with ongoing work on a Digital Critical and Synoptic Edition of James Joyce’s *Ulysses*, and as only one of several modularised visualisation tools there in demand, the *Diachronic Slider* constitutes but one of several modularised interface designs under present development to visualise synoptically structured diachronic (genetic) text data under multiple perspectives. Interoperability is thus built into the development from the start. Our expectation is that user requests and use cases adduced will contribute to ramifying and strengthening our proposed approach to textual and critical investigation of multiple-text heritages.

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Interfacing Literary Genesis

Elli Bleeker and Aodhán Kelly¹

Abstract

This article examines ways in which the principles and scholarship of genetic criticism can be communicated to an audience of non-experts, explored through the means of a case study. This takes shape in the Brulez Digital Exhibit (BDE), a result of a collaboration between different parties involved in the GLAM sector and led by the Centre for Manuscript Genetics at Antwerp. The digital museum exhibit conveys scholarship on the manuscripts of the work *Sheherazade of Literatuur als Losprijs* (1932) by Raymond Brulez, and has been integrated into the permanent exhibition space of the *Letterenhuis*, the literary archive and museum in Antwerp. The paper discusses what could be gained or learned from a collaboration with such partners during the development. It further explores the classification of the BDE as a form of interface and scholarly output of a text editing project. In conclusion, it shows how we can find new and more effective ways to increase the dissemination and outreach of the textual genetic research.

1 Introduction

The collection of the *Letterenhuis* (the Archive and Museum of Flemish Literature) in Antwerp is composed of thousands of manuscripts and documents, which collectively represent the material traces of 200 years of Flemish literary history. Well-known literary works to *petites histoires* and forgotten masterpieces can be found there, on seemingly negligible scraps of paper or in carefully bound books. The archive is open to all who wish to study the collection, but in practice only a few respond to its allure. The handful of scholars and students in the archive's reading room have specific reasons to be there and determined research questions to answer – informing these visitors about the value of pre-publication materials would be like preaching to the choir.

It is a situation that scholarly editors are also familiar with. Together with archivists, they are gatekeepers for literary treasures, but it is not always that busy at the gates (Vanhoutte 101–2; Lavagnino 65; Pierazzo 150). Nevertheless, many people find it

¹ The research leading to these results has received funding from the People Programme (Marie Skłodowska-Curie Actions) of the European Union's Seventh Framework Programme FP7/2007-2013/ under REA grant agreement n° 317436.

interesting to have a peek at how writers think, read, and write. They are keen to see the manuscripts of canonical works like Proust's *A la recherche du temps perdu* or Goethe's *Faust* – and are sometimes even prepared to pay a good price for that privilege. So the audience is, in principle, interested, the material is there, and the scholar eager to share: what is lacking? How can we (re)gain the public's attention in relation to writer's manuscripts? Is it a matter of presentation? The digital edition may offer an ideal platform for representing text in all its forms – in contrast to the impervious print edition – but as of yet there are few general procedures to translate these ideals to actual interface design (Porter). This paper argues that scholarly editors can play a major role in the development of visual ways to represent text and, as a result, gradually expand their role as textual curators. It follows that editors are not only to be concerned with the documentation, storage and preservation, but also with the digital representation and sharing of textual objects.

The paper illustrates this argument by means of a case study on the collection of stories *Sheherazade of Literatuur als Losprijs* (first published in 1932; henceforth *Sheherazade*) by Flemish author Raymond Brulez. Our study of *Sheherazade* follows a genetic orientation to text,² meaning that the focus is on how the text developed over time, reconstructing the process of writing based on the draft documents of the work. The documents are taken “as sources of evidence of textual development and change through time” (Van Hulle and Shillingsburg 36), in other words, they are testimonies of Brulez' writing process. These textual objects present their own set of challenges and opportunities for interface design and editorial curation. The material comprises of notes and rough sketches, heavily revised manuscript pages that testify to writer's struggle, corrected typescripts that show a publisher's intervention and censorship, and so on. The body of documentary material related to a literary work, including those writing notes and draft manuscripts, is called the genetic dossier or *avant-texte*.³ Through a careful study of the *avant-texte* it is possible to reconstruct the development of a literary work. Seemingly insignificant scraps of manuscript, then, become pieces of a puzzle; interrelated nodes in a network of textual fragments. A team of researchers from the Centre for Manuscript Genetics (CMG) in Antwerp⁴ set out to represent this complex network in a way that is appealing to a large audience. In close collaboration with external partners, the CMG created a digital museum exhibition of *Sheherazade* that showcases the *avant-texte* and introduces the user to the stories the documents convey. This resulted in the *Brulez Digital Exhibit* (BDE), a

² This term, coined by Dirk Van Hulle and Peter Shillingsburg (2015), groups together all textual research into draft text and literary writing processes.

³ For a more detailed explanation of the concept of *avant-texte*, we'd like to refer to the online *Lexicon of Scholarly Editing*, initiated by Dirk Van Hulle and developed by Wout Dillen. See uahost.uantwerpen.be/lse/index.php/lexicon/avant-texte/ Accessed 24 Oct. 2017.

⁴ The researchers in question are Vincent Neyt, Dirk Van Hulle, Aodhán Kelly, and Elli Bleeker.

digital artefact that is based on scholarly research but intended to be used by a wider audience. The present paper sets out to reflect on the objectives and the results of the BDE project, looking at how its objectives relate to scholarly editing and interface design. In particular, we examine how to communicate the specific aspects of textual genetic research of *Sheherazade* to a non-specialist audience.

The paper is divided into four main parts. The first section looks at general interface design principles and considers their relevance to (digital) scholarly editing. It then dives deeper into the genetic orientation to text, by giving an account of its main research objectives and describing what can be found when we look at the *avant-texte* of *Sheherazade* from a textual genetic perspective. The third section, then, examines how a collaboration between scholarly editors and external partners led to a digital cultural artefact (i.e. the BDE) that resonates with different audiences. We review what this collaboration entails and how to conduct such a process productively. The fourth and final section addresses the questions of classification and evaluation of the BDE. We propose to consider the digital object not as a spin-off, but rather as one interface for the CMG's research findings. We examine whether the BDE can be classified as a scholarly output, and whether creating these kind of objects should count among the tasks of digital scholarly editors. The question of evaluation of the BDE, finally, is approached in two ways. On the one hand, we evaluate its efficacy based on user testing. On the other hand, we describe the challenges of evaluating this kind of digital object from a scholarly perspective. These challenges include – but are not limited to – providing access to the underlying code, documenting the argument we make through the interface, and the possibilities to reuse an idiosyncratic interface.

With this paper, we intend to shed new light upon a collaboration between different parties that was aimed at creating novel representations of text. By analysing the outcome of this partnership, we enhance our understanding of the function of interfaces of digital scholarly editions. This, in turn, contributes to a deeper reflection of the role of scholarly editors within the digital paradigm, of the tools they have to share their knowledge, and how multidisciplinary collaboration can help them to communicate a sense of the textual treasures contained in a work's *avant-texte*.

2 Interfaces and digital scholarly editions

2.1 The principles of interface design

The very concept of an interface is quite broad and ubiquitous. When examining which interface principles can be relevant for scholarly editions, therefore, it is useful to narrow the scope, and look at how interfaces are used for digital humanities projects. Based on the literature, we distinguish three possible functions of interfaces. First of all, an interface can be used to make a site's content accessible for an audience

broader than those who would normally visit the site; it can be “generous” in the sense that it can reveal the scope of a collection’s contents (Whitelaw §3, §46). Mitchell Whitelaw describes how, “in revealing the complexity of digital collections, a generous interface would also enrich interpretation by revealing relationships and structures within a collection.” (§3) This generosity is closely connected to a second principle of interface design, namely that an interface can best be “visually rewarding for the reader of research results” (Ruecker *et al.* 13). A visually attractive interface encourages the user to continue browsing the collection, making the use of the site enjoyable on a functional level. This may seem obvious, but Matthew Kirschenbaum points out that the interface of digital humanities resources “at times seem little loved” (online, n.p.). One possible reason for this is offered by Alan Galey, who describes the unfortunate tendency of DH to treat activities of text encoding and interface design as separate concerns that occur “at opposite ends of the research plan”, thus missing the opportunity to model the relationship with the user in the interface (Galey 114). In this respect, Galey as well as Kirschenbaum identify two dangers of deferred interface design in a digital humanities project: first, that a hasty, under-resourced design phase is disproportionate to the influence of that design in the reader’s experience; and second, that deferring the interface assumes content is distinct from, and precedes, form (Galey 111).

It can be said, then, that an interface benefits both from modelling the functional aspects of the design and from a certain focus on its aesthetics. Aesthetic design has been shown to increase the perceived usability and thereby the overall usability of a digital resource (Kurosu and Kashimura 1995). Indeed, the aesthetic appeal could be central to successfully engaging with the public. A third and final principle is that an interface needs to be as intuitive as possible in order to engage and sustain the attention of the user: users are more likely to “use trial-and-error methods at interactive exhibits than to read instructions” (Bachta *et al.* 2012). For that reason, they would first need to be able to intuitively identify: What am I looking at?; Why would I want to look at it?; What can I do with it?⁵ If these conditions are met then there is a much increased prospect of communicating the scholarly message.

2.2 Interfaces for digital scholarly editions

In the field of digital scholarly editing, meanwhile, the topic of interfaces has grown in importance and has furthermore been subject to considerable discussion. Nevertheless, as of yet, no standards for the development of interfaces for digital editions exist. One reason for the lack of standards seems to be that digital editors cannot agree whether they actually want one (Porter, footnote 6). The downsides of providing an interface

⁵ These are three principles of rich prospect interfaces for cultural heritage (Ruecker *et al.* 6).

for your edition are famously put forward by Peter Robinson who describes that, while a specific interface presents (a tool to explore) certain aspects of the edition, it obscures the rest of the underlying dataset⁶ (Robinson “Five Desiderata”). Robinson proposes that this dataset be made available in its entirety – and under free licensing – for APIs and other forms of reuse. The same argument is made by Bodard and Garcés (85) who rightfully point out that making the edited texts as well as the digital framework fully available is crucial for the reproducibility and accountability of the editorial work. If the dataset is locked away and only accessible through an interface, the scholarly work lacks transparency. For that reason, Robinson states “your interface is everyone else’s enemy” (“Five Desiderata”). Animosity aside, it is a truism that an interface steers or manipulates the ways in which a reader can use your edition has been pointed out by others as well. Indeed, an interface contains an argument about a collection (Ruecker et al. 2015; see also Nyhan), making the edition’s interface an inextricable part of the editorial argument (Andrews and Van Zundert in “What Are You Trying To Say?”). It follows that the subjective characteristic of an interface should be made clear to users, and the workings of the interface itself should be documented and explained. What is more, it does not suffice to simply make the scripts and software available by uploading them in online repositories like GitHub or SourceForge: before datasets can be understood or reused by third parties they need to be properly documented as well.⁷

Nonetheless, as long as the editor is clear about the ways an edition’s dataset is handled, having an interface can be advantageous. Some of these advantages are mentioned by Wout Dillen, who describes the interface as a tool for editors to make their presence known to the reader, just in case the latter is in need of an expert guide (“The Editor in the Interface.”). The function of an interface for a digital edition, then, would be twofold: first, it offers the editors a tool to set forth their argument and highlight certain features they consider worthwhile; secondly, it provides users with a chance to view the text through an expert’s lense, which, hopefully, leads to a deeper understanding of the edition’s text. It should be noted here that Robinson, too, acknowledges the use of an interface for users that are not technically savvy enough to directly access and process the underlying dataset directly (“Why Interfaces Do Not and Should Not Matter”). In conclusion, then, we can say that the animosity of an interface depends on how heavily it influences the use of an edition, and whether

⁶ With “dataset” we mean everything that constitutes a digital edition, from source files (e.g. XML transcriptions), scripts and tools to the encoding guidelines, schemas, and the documentary material.

⁷ Another practical and hard-to-ignore issue with providing full access to the content of an edition is that some of the authorial material may still be copyrighted. In many cases, editors need to make provisions and partly secure the content of their edition. The debate about copyright and Open Access for digital scholarly editions (and Digital humanities research in general) is still very much ongoing, but not part of the scope of this article.

or not a user understands how the interface highlights and obscures parts of the collection. The interface of a scholarly edition appears to be much more than a glossy layer of design: it can guide the perspective of a user and thus indirectly communicate editorial knowledge.

Choosing to create something within a museum space as a form of engagement is indeed a little less common in textual scholarship. Still, Bailey-Ross et al. argue that public engagement in these spaces can and should form a core part of digital humanities projects as it can further inform research, improve learning, and increase the social impact of research (1–2). This is aided by the goals of these public facing institutions which are constantly and increasingly working towards establishing new forms of engagement and participation, by providing innumerable resources that facilitate visitor participation, interaction, and learning (4). Of course, the digital turn has had a transformative impact on the field of museum studies and its associated practices and concepts – just as we have seen in digital scholarly editing. Ross Parry has called the process of transformation the ‘re-coding’ of museums – within which “notions of visit, of object, of collection, of expository space, of curatorial authority, have all become recodified” (14). Competition for attention in a museum setting, however, could be quite challenging and there may be a relatively small window of time for us to first engage a visitor’s attention. A report conducted into the use of touch tables in museums suggested the average time using these devices was approximately two minutes (Goldman and Gonzales 2). Two minutes is certainly a short time within which to communicate a relatively complex message regarding textual genesis, but, hopefully, not impossibly short.

These observations suggest that digital scholarly editors could make good use of an interface. It can most notably be implemented to reach out to users that would otherwise not been part of the intended audience. Elena Pierazzo notes that while it seems “delusional” to hope for a large and general audience, scholarly editors may well commit themselves to creating “outreach editions” that still present the rich, fluid nature of text and its transmission history (Pierazzo 152). We are reminded of Whitelaw’s generous interface, or the interface of Ruecker et al. for rich prospect browsing: interfaces that are rich and that represent the entire scale of the collection, while simultaneously providing sufficient tools to explore that collection and the complex relationships between the various items it contains.

3 The genetic orientation, curation, and *Sheherazade*

Let us turn now to some of these complex relationships as they can be found in the *avant-texte* of *Sheherazade*. The CMG has been working with Brulez’ manuscript

material for some years now.⁸ As mentioned above, the archival material is examined from a genetic orientation. This means that *writing* is understood to be a dynamic process, and *text* as a fluid entity with no specific beginning or end.⁹ Based on the CMG's research, it is possible to (partly) reconstruct Brulez' writing process. We can, for instance, trace the development of a sentence across document borders – from note to manuscript to typescript – or verify external influences on Brulez' creation process. It is, however, difficult to convey these findings to non-experts or, for that matter, to anyone who is not distinctly familiar with Brulez' life and work.

The frustration regarding this topic is aptly summarized by Robert Darnton, who acknowledges that “any historian who has done long stints of research knows the frustration over his or her inability to communicate the fathomlessness of the archives and the bottomlessness of the past” (7). Darnton muses over ways to make available “the raw material embedded in the story” and specifically to provide readers with an awareness of “the complexities involved in construing the past” (7). While he is a book historian by trade, the yearning Darnton describes is well-known among scholarly editors too. Their research brings them to literary archives and boxes filled to the brim with documents. After an in-depth study of the content of these boxes, scholarly editors can form a plausible picture of the text's history, while remaining aware of the complexities inherent to the material. So if we, as editors, function both as gatekeepers to and as curators of a text, how can we guide users through a digital *avant-texte*? How can we relate to them the development of a sentence in *Sheherazade*, show Brulez' work methods, and reveal his sources of inspiration?

3.1 The *avant-texte* of *Sheherazade*

The documents directly related to *Sheherazade* are spread over three archival boxes (identifiers B917/H2a, B917/H2bis, and B917/H3) in the archive of the *Letterenhuis*. For the most part, they contain notes and draft manuscripts in the author's hand, as well as typescripts and page proofs with authorial revisions. The stories of *Sheherazade* are written between 1928 and 1930, during the so-called golden age of the contemporary manuscript.¹⁰ Similar to modernist authors such as James Joyce and Virginia Woolf, Raymond Brulez displayed a conscious interest in his own writing process. He believed

⁸ This entails a detailed study of the genetic dossier and a TEI/XML transcription of the manuscripts among others. Moreover, Dirk Van Hulle used the material for his courses on genetic criticism at the University of Antwerp, creating together with Vincent Neyt an interactive online environment for students: www.brulezarchive.org/.

⁹ Most editorial projects undertaken at the CMG follow this orientation to text, see the Samuel Beckett Digital Manuscript Project (2010 -) on www.beckettarchive.org (Accessed 27 April 2017).

¹⁰ With regard to western manuscripts, in fact, this golden age has been defined as the period between 1750 and 1950 (Grésillon 11), a time when paper was inexpensive enough to be used for drafting and sketching, and when authors preserved these drafts out of an interest in the creative processes.

that the journey, or the writing process, was equally important as the destination, i.e. the literary work (Brulez 62). This led him to ardently collecting all material traces of that process, resulting in a vast collection of draft documents.

On a narratological level as well, *Sheherazade* constitutes an ideal candidate to communicate the principles of textual genetic research. Needless to say, it is inspired by *One Thousand and One Nights*, a collection of oriental folk tales compiled over the course of several centuries, the oldest version of which dates from the 9th century (Reynolds 271). In the protagonist of the Arabian frame story, Scheherazade, Brulez recognized a fellow story teller labouring to find plots and storylines. He epitomized the oftentimes difficult process of writing in his version of *Sheherazade*, by letting his heroine buy her life and her freedom with stories written for the sultan's diversion. Brulez later described the storyteller Sheherazade as patron saint of literature who is incarcerated by the Sultan, as her critic. The mental hard labour of Sheherazade acts as a metaphor to demonstrate the form of "torture" that a writer must endure (Brulez 61). This narrative provides a colourful metaphor that, along with the extant document material in the archive, makes an amenable feature to demonstrate *Sheherazade's* textual genesis to users.

At first sight, the draft documents do not convey much information: they need to be presented in a certain order and context before they become meaningful.¹¹ When trying to make sense of a writing process, a first intuition is often to distinguish a chronological order, or at least a sequential arrangement of the material. This ordering works relatively well for Brulez. In general, his work method can be described as part structural, part improvisation.¹² He used pen and paper as cognitive aids, to structure his thinking and facilitate reflection. He usually started with making notes, then sketched a writing plan to help structure and organize the notes (see fig. 1).

The notes and sketches served as a basis for a first draft of the story: large parts of the text on the notes are incorporated in the manuscript. After using the text of a note, Brulez crossed it out to avoid reuse. The draft manuscripts served as a base for one or two typescripts which Brulez subsequently revised. The revised typescripts were sent to magazines or journals for publication, so for some stories there exist (corrected) page proofs. However, his process was not entirely linear and chronological: we can distinguish various successive layers of revision in the writing plans, manuscript, and typescripts. For instance, after changing the order of the stories in *Sheherazade*, Brulez returned to the writing plan and updated it. There are, of course, also the roads not taken or abandoned routes – so called "*cul-de-sac*" sentences (Van Hulle, "Collation de réécritures" 283). These are dead-ends in the writing process: fragments of text that did not make it into the published version. In short, various routes meander

¹¹ This is in addition to the fact that Brulez had quite an illegible handwriting.

¹² In the terminology of Pierre-Marc De Biasi, Brulez' work method can therefore be placed between *écriture programmatique* and *écriture à processus* (De Biasi; Fierens).

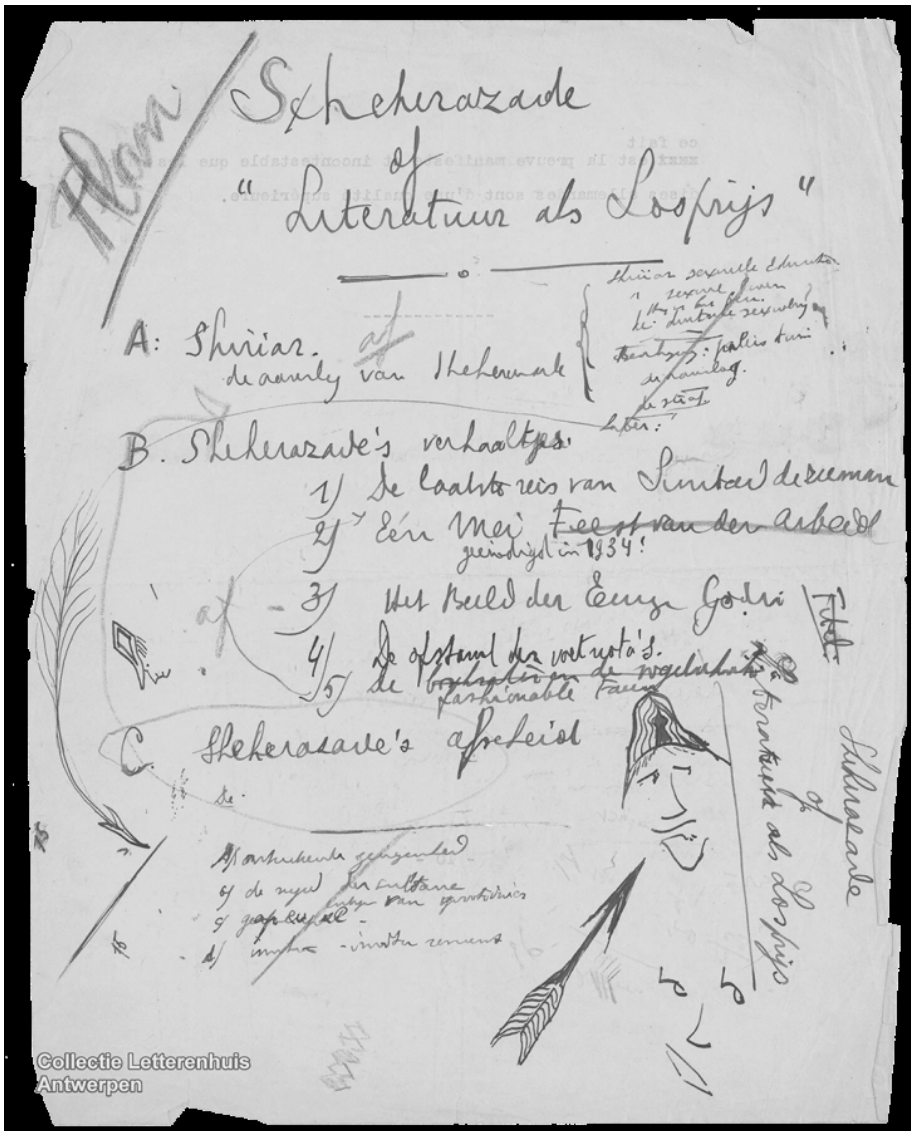


Figure 1: Plan for Sheherazade.

through the *avant-texte* of *Sheherazade*; together they map the journey that was Brulez' writing process. A chronological arrangement of the material, therefore, requires the inclusion of such deviations and divergences.

3.2 Genetic paths in the *avant-texte*

In trying to capture and represent some of these routes or pathways, we took some inspiration from the idea of a "genetic path" described by Paolo D'Iorio (see Bartscherer "Ecce HyperNietzsche"). In this model, the editor is a metaphorical pearl diver who collects beautiful gems from the bottom of the sea. Such a gem – a *pearl* – is a special element or unit in the archive. Pearls range in size and could consist of textual fragments, editorial commentary, or complete notebooks among others. For instance, if we want to study the development of a certain word, we could search for all pearls that contain this word, string them together in a chronological order, and thus generate a new sequence called a genetic path.

The concept of a *genetic path* that follows the development of a specific textual instance also underlies the revision narrative in John Bryant's theory of Fluid Text editing. In short, a revision narrative is a description of textual variance provided by an editor. It may "tell a complex tale of intentions and maneuvers with novelistic intensity and suspense" (Bryant 159). Accordingly, the editor is given a *carte blanche* when it comes to describing the poetics of textual variance – naturally within the boundaries of editorial methodology – which makes the revision narrative the primary means of communication between editor and reader. With this unconventional take on the classic form of the critical apparatus, which only records variance but makes no effort to explain it, Bryant proposes a means to "map out variation, chart paths from one version to another, and enable users to lead themselves along those paths" (123). In this setup the editor takes users by the hand and shows them how the text develops, on the way presenting them with interesting discoveries and persuading them to go exploring the *avant-texte* themselves.

The BDE consists of three genetic paths with revision narratives. One of them, named after *Sheherazade*'s frame story "Wat is Liefde zonder Verleiding",¹³ concentrates on Brulez' working methods as described briefly above. It is intended to give users a peek "behind the scenes", a visit to the writer's workplace, and shows Brulez' particular way of writing. The path demonstrates the tactile and material aspects of the first stages in the writing process by zooming in on the way he arranges and processes the notes, and by showing how he used colour coding and letters to organize the narrative elements. The method of *bricolage* also constituted an important element in the composition process: for instance, Brulez sometimes cut up notes to synthesize

¹³ This translates to "What is Love without Seduction".

PROGRAMME

1. Shéhérazade N. RIMSKY-KORSAKOW suite symphonique (1844-1908)

Cette *suite*, du plus pittoresque et du plus coloriste des musiciens de l'Ecole russe moderne, date de 1888 ; le sujet est emprunté aux *Mille et une nuits*.

Le musicien a inscrit en tête de sa partition la légende suivante :

« Le sultan Shahriar, persuadé de la fausseté et de l'infidélité de toutes les femmes, avait juré de faire donner la mort à chacune des siennes après la première nuit. Shéhérazade sauva sa vie en intéressant son maître aux contes, qu'elle lui racontait pendant mille et une nuits. Pressé par la curiosité, le sultan remettait d'un jour à l'autre le supplice de sa femme et finit par renoncer à sa résolution sanguinaire ».

Voici les épisodes, que Rimsky-Korsakow a illustrés du prestige d'une palette sonore unique de richesse et de variété :

- a) La mer et le vaisseau de Sindbad le marin.
Largo maestoso — Allegro non troppo.
- b) Récit du prince Kalender.
Lento — Andantino — Vivace.
- c) Le jeune prince et la jeune princesse.
Andante quasi allegretto.
- d) La fête à Bagdad,
Allegro molto.

Violon-solo : M. Henry Gadeyne.

2. Concerto en si bémol L. BOCCHERINI pour violoncelle et orchestre (1743-1805)

*Allegro moderato ;
Adagio cantabile ;
Allegro vivo.*

Solo : M. Enrico MAINARDI.

Luigi Boccherini, violoncelliste-virtuose et compositeur fécond, a écrit un nombre prodigieux de trios, quatuors, quintettes, une vingtaine de symphonies et des concertos pour violoncelle, ainsi que de la musique d'église. Sa destinée ne fut guère heureuse ; malgré leur grande vogue, ses œuvres ne rapportaient rien et il ne sut s'attacher nulle part et il mourut dans la plus profonde misère.

Collectie Letterenhuis
Antwerpen

Figure 2: Brulez' copy of the concert programme for Rimsky-Korsakov's Shéhérazade performance in Oostende 1929.

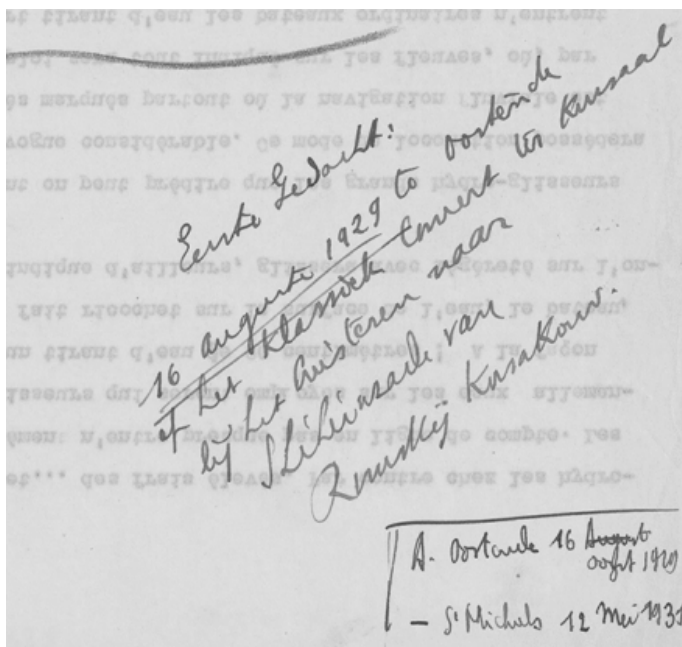


Figure 3: Brulez' inscription on cover of the draft writing notes for Sheherazade.

different textual fragments. Puzzling together the various loose snippets allows the reader the various loose snippets, but it allows the user to catch a glimpse of the abandoned roads and those *cul-de-sac* sentences. The notes, as such, provide material traces that transcend document borders. Stringing these traces one after another allows us to reconstruct genetic paths that indeed crisscross through the *avant-texte*, demonstrating how the textual fragments constitute a rhizomatic web of interrelated elements.

Another genetic path in the BDE illustrates Brulez' first moment of inspiration for the story collection and show some of the external sources that influenced the evolution of the work. In the summer of 1929, Brulez attended a symphony concert of the Russian composer Nikolai Rimsky-Korsakov's *Shéhérazade* performed in Oostende (Belgium). He kept a copy of the concert programme upon which he marked the summary in blue pencil (see fig. 2). Brulez later marked this moment of inspiration on the cover of his draft notes for *Sheherazade*: "First thought: 16th August 1929 in Oostende at the classical concert in the Kursaal when listening to *Shéhérazade* by Rimsky Korsakov" (see fig. 3). This path includes an audio recording of the symphony.

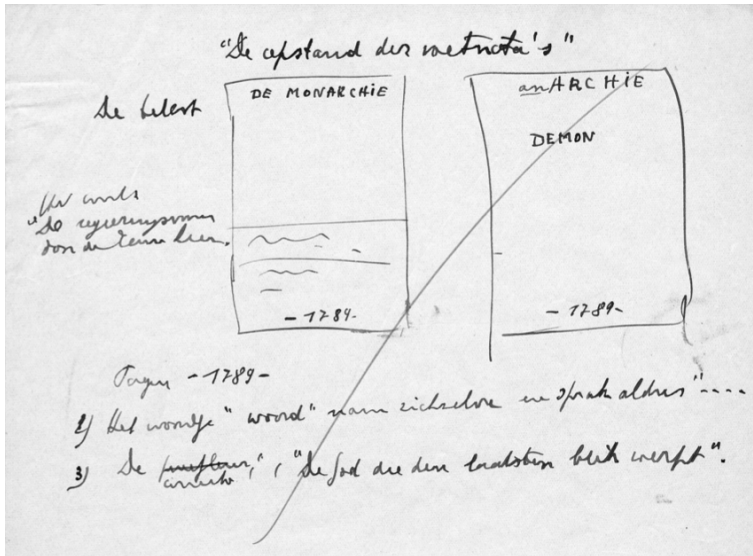


Figure 4: Plan for 'Opstand der Voetnota's'.

The third and final path delves deeper into one of the stories, "De Opstand der Voetnota's"¹⁴ that contains wealth of literary references, ironic anachronisms, and allusions to contemporary politics and society that the collection of stories contains (Van Parys 130). Furthermore, this particular story has an interesting background when it comes to typography, which plays an important role in the story. The draft manuscripts, typescripts, and page proofs are therefore visually compelling (see fig. 4). Finally, it has an interesting publication history that illustrates the concept of "epigenesis", i.e. how text continues to develop after its (first) publication. In this case, the story changed appearance over the course of the years due to practical and ideological constraints of different publishers (see also Van Hulle "Letterenlaboratorium").

The individual genetic paths illustrate, one by one, three key concepts of the genetic orientation to text: exogenesis, endogenesis, and epigenesis.¹⁵ Although the paths are only a fraction of what the *avant-texte* of *Sheherazade* contains, it is already quite

¹⁴ "The Rise of the Footnotes"

¹⁵ The terms "exogenesis" and "endogenesis" were first coined by Raymonde Debray Genette (28). They mean respectively the gathering of external sources and the incorporation and processing of those sources into the text proper (see also De Biasi 42-4). Dirk Van Hulle expands upon these ideas by adding the term "epigenesis": the continuous development of the text after the moment of publication (Van Hulle 7).

a challenge to describe the textual and material relationships in sufficient detail, with respect for alternative routes and without oversimplifying the scholarship that went into the establishment of these paths. Indeed, only through the CMG's study of *Sheherazade*, it was possible to create three genetic paths that each communicate a certain "story" to the users of the BDE. As will be described in more detail in section 4, the paths consist of audio-visual material combined with editorial annotations. The users of the BDE are free to deviate from the sequential order in which the fragments are presented, which is intended to convey the meandering, non-linear aspect of a writing process.

In this respect, it is interesting to consider the remarks of Paul Rosenbloom who argues that great science typically has three attributes: veracity, importance, and novelty (221–2). Rosenbloom claims to be less interested in the methods, as long as they are convincing and lead to something new and compelling. According to him, researchers can be too focussed on veracity, while he personally tends to learn more from things that are important or present novel conjectures. This argument could also be applied to textual scholarship that is traditionally extremely focussed on the veracity of texts and editorial methods. If we want to be able to communicate our knowledge of texts with broader audiences, then we may need to place more emphasis on convincing users and readers of the importance of our topics, and on isolating interesting novelties within our research in order to capture their attention.

This careful and thoughtful process of selection must then be performed in much the same way as the curator of a museum must decide upon selecting a tiny percentage of their collection to put on display, which is interesting, informative, and reflective of the entire collection of objects. The British Museum, for example, is only able to place 1% of their collection on public display in Bloomsbury at any one time, which must be a rather arduous process.¹⁶ We, as scholarly editors, in an equivalent curatorial context with our chosen documents and texts, might find it very confronting to select a mere 1% of our scholarship that must be communicated in an engaging and representative fashion. Participating in this act of curation not only involves selecting and presenting static material objects, but also communicating our knowledge to the user in the form of a revision narrative. As such, we hope to show users how enticing the content of the boxes in a literary archive can be.

4 Building the Brulez Digital Exhibit

As said, the BDE is the result of a collaborative effort between textual scholars, web designers, and a cultural heritage institution, and it relies on the strengths of all parties.

¹⁶ See the Fact Sheet of the British Museum collection: www.britishmuseum.org/pdf/fact_sheet_bm_collection.pdf.

The previously existing relationship between the CMG and the *Letterenhuis* was a fairly traditional one in which, primarily, an archive provided scholars with access to materials. This digital exhibit project allowed the two groups to collaborate in a new way and on something that was mutually beneficial. The partnership with the developers by the Antwerp communication agency Prophets, proved to be both useful from a practical side of creating the exhibit and also by offering another perspective, that of an enthusiastic but uninformed audience in the area of genetic criticism. This initial audience became part of the process through which the communication of the scholarly research results and objectives were defined and refined. A balance had to be struck with adhering to more scholarly research objectives while also presenting information in such a way that was both understandable and interesting for non-expert users. There is considerable value in this type of interaction as has been argued by Ruecker et al.: “the connection between graphic design and academic research has implications for the ongoing need for improved communication between the academic and non-academic worlds” (13). A notable outcome of this relationship was a stronger emphasis on the importance of being selective with content and refining it significantly in order to ensure that the most suitable interface design was implemented.

As said above, the communicative aim of the BDE is to showcase the multiplicity of genetic research and the features of genetic criticism by emphasizing that textual genesis is not a linear process towards a final, finite state of the text, but a transformative and dynamic process in which each textual state is of equal importance. The BDE is designed to present users with a very first impression of the different aspects of genesis, a concept illustrated through the material evidence from the archival boxes of *Sheherazade*. A relatively detailed description of its structure, navigation, and aesthetics is necessary in order to express the importance of the process and outcomes of interface design for the *Brulez Digital Exhibit*. This is, furthermore, needed in order to classify the exhibit as a form of publication and to attempt to situate it as a form of interface among the existing research outputs in the field of textual scholarship. Finally, describing the decision making process that was involved in building the exhibit could further enable the evaluation of the outcome.

4.1 Structure of the BDE

The BDE is structured quite similarly to the story collection of *Sheherazade* itself, with a top level grid much like the frame story and two sub-grids or sub-stories, all containing genetic paths. As such, we addressed the observation of Kirschenbaum, who argues that “an interface, whether the windows and icons of a website or the placement of a poem on a page, can somehow be ontologically decoupled from whatever “content” it happens to embody” (524). The top-level grid, simply called

Sheherazade of literatuur als losprijs, introduces the user to the concepts of the BDE and to the writer and this particular work. This top-level also introduces the first genetic feature, the inspiration, through materials connected to the Rimsky-Korsakov concert (thus touching upon the concept of exogenesis) and Brulez' conceptualization of writing as a sea journey. The first of the two sub-grids, *Wat is liefde zonder verleiding*, guides users through the genetic path that demonstrates the planning, note taking, cutting, pasting, and restructuring of the plan until it reaches a published table of contents. This addresses the materiality of writing and Brulez' working method of cut-and-paste (*bricolage*) as it is described above. The second sub-grid is the genetic path of *De opstand der voetnota's* that explains the concept of the story as well as demonstrating its evolution through plans, drafts, typescripts, and publications. Each step is conveyed as a slide with visual and verbal information: several images and a caption with a short explanation. The combination of text, images, audio and video files provides considerable flexibility to craft a dynamic telling of the genetic paths.

4.2 Navigation

The initial slideshow presentation that was used to brief the web developers on the content of *Sheherazade* and the overall concepts of the genetic research proved to be highly effective and had therefore a great impact on the final design in which users click through the successive stages of a genetic path in a sequential order. Users can navigate through the sequence by using the arrows on the right and left of the screen or the numerical navigation bar on the bottom right. As such, the narrative of this genetic path is set up as a linear story in which the manuscript fragments are chronologically ordered, whereby the user may follow a premeditated route through the *avant-texte*. Some first time users may prefer this option to exploring the material, but users are not bound by the constraints of the narrative: they can leave it or access it at any point. The transition between slides, too, does not have a *linear* feel to it; rather, it swivels and spins from one frame to another. It is one of the aesthetic features that – hopefully – convey the sometimes non-directional process of writing even though the story of that process is told in a linear narrative.

This additional navigation and user freedom adheres to common user experience (UX) practices. For instance, Jakob Nielsen and Rolf Molich stressed the importance of “user control and freedom” and “flexibility and efficiency of use” (??). *User control and freedom* refers to how “users often choose system functions by mistake and will need a clearly marked emergency exit to leave the unwanted state without having to go through an extended dialog [...]” (Preece et al. 501). *Flexibility and efficiency of use* refers to “accelerators – unseen by the novice user – may often speed up the interaction for the expert user such that the system can cater to both experienced and inexperienced users [...]” (502). In analogy with Brulez' metaphor of writing,

then, the BDE allows its users to wander around and be blown off course as well. A second feature of the navigation addresses the aforementioned principle of *rich prospect browsing* (Ruecker et al.). This suggests that the primary webpage needs to provide users with a good visual overview of all the content available to them, understand how they can call it or manipulate it, and be in full control of the display and manipulation tools (3–4). This corresponds with the intention of giving the user an idea of the interrelated, networked structure of Brulez' writing space. Accordingly, the homepage is visually portrayed as a messy writer's desk where all the elements contained in the exhibit were laid out.

Taken together, the navigation and visualization of the BDE deal with a certain duality in genetic criticism. On the one hand, it is important to convey the development of text. Text is linear by nature and can be represented in a sequential manner, but these characteristics do not apply to its development and composition process. When we construct a path we establish a chronology. By constructing a sequential path, a chronology in the textual constitution is established that implies a certain linearity. On the other hand, there is also an attempt towards capturing and conveying the nature of thought – both the thoughts of Brulez and of the editors – that can be seen as an interconnected network of associations and fragments, interwoven in a rhizomatic fashion. This duality is not problematic but suggests specific ways of visualization in which the two means of perceiving – linear and rhizomatic – are not mutually exclusive but mutually informative.

4.3 User experience and reusability

The concept of a genetic path in the form of a dynamic narrative that can be accessed at any point is adopted to present the user with in-depth information about the textual genesis of *Sheherazade*. It presents a scholarly hypothesis, but with a minimal threshold. By clicking through the path from beginning to end, the user is guided through an editorial argument. Keeping in mind the duality of genetic criticism, it can be said that these genetic paths are visual representations of the linear structure of text or, more precisely, of the scholarly argument about its composition. While the landing page, in its simulation of a writer's desk, represents the networked or rhizomatic nature of the writing space. Here, the visual arrangement expresses an aspect of writing that is difficult to put into words. It is, however, only by stitching together these different fragments that a coherent, meaningful whole emerges.

Arguably the most challenging design ambition of the BDE was to find a means to visually represent the physical dynamism of the writing process, in other words to demonstrate the movement, change, and non-linearity of text production between the notes, drafts, typescripts, proofs, and publications. The solution offered by the web developers for this visualisation was to create animations of the materials that

could be integrated into the exhibit as videos by users. Two of the three genetic paths are introduced by short video animations that set the scene and provide a visual framework for the path in question and the related documentary material. Set to the music of Rimsky-Korsakov's *Scheherazade*,¹⁷ the two videos show the animated manuscripts of Brulez: letters appear on the page, documents are blotted with ink or marked with red pencil, words are crossed out – in short, the full dynamics of writing in motion. The animations are not intended for viewing outside of the exhibit as they do not provide sufficient contextual background knowledge for the viewers alone. While the information presented in the genetic path clarifies the animations, the videos contribute to the narrative by making the story of the genesis more dynamic.

The underlying code for a blank template of the digital exhibit will be made available on GitHub¹⁸ along with some installation documentation in the near future. It is also being investigated how to apply a Creative Commons licence that is as open as the content will allow. In this way, we hope that the BDE can maximise its contribution to the scholarly community. It is possible that researchers at the CMG may decide to add further genetic paths to the exhibit in the future or apply the software's framework for use with another writer. It is actually fitting that the overall project may never be “finished”. In line with the idea of genetic criticism, which values the process over the final product, the BDE is an intermittent product of an on-going research process.

5 Classification and evaluation

5.1 Content and classification

Usability testing was conducted during the build phase in the form of two comprehensive user observation sessions in which the subjects were asked to navigate the entire site and to speak their thoughts aloud, while team members recorded notes of their actions and thoughts. These tests helped identify issues in the usability of the website, in particular the navigation logic, which was relayed back to the web developers. It also helped identify where the content of the exhibition needed improvement and clarification, either in terms of the order of the narrative or difficulties with concepts and language. What became very apparent was that the exhibit in this demo stage initially presented far too much information to hold user's attention, which resulted in another round of team curation to clarify and reduce the content. As said above, this tendency towards brevity is something which goes against the natural instincts or initial desires of many a scholarly editor who, ideally, wants to share their detailed knowledge with the world. Indeed, Philip Gaskell describes that

¹⁷ The music used in the animations is a recording of *Scheherazade* conducted by Leopold Stokowski in 1934 (CC BY-NC-SA 3.0).

¹⁸ See: github.com/centre-for-manuscript-genetics.

it may be tempting for an editor to suppose that he should present all the evidence concerning every version of his text, and should annotate practically every word of it; tempting cause the inclusion of everything would relieve him of the difficulty of deciding what to omit, and would also guard him against possible criticism for having omitted what he should have included. [...] [The editor] will often want to record his hard-won expertise even when it does not directly illuminate the text. But his job is to convey the author's work to his readers, to show off his own scholarship; and the readers are interested not in the editor but in the edition. (Gaskell 6–7)

Identifying a selection of the more important research findings may provide editors with an opportunity to situate the value of the scholarship in a broader context and better disseminate the documentary materials and background knowledge. With regard to the BDE, such a curative approach to the content proved to be an extremely challenging activity: it required the input of four scholars from the CMG as well as feedback from designers and users. This alone suggests that the creation of outreach publications for dissemination, in order to be successful, can be treated as a critical scholarly endeavour. The resulting product can, therefore, be deemed to be “scholarly”. As the outcomes of the interface design had a substantial influence on the curation and selection of content, thus the content and form of this digital exhibit are almost inextricably linked. Design and curation, then, are not two separate processes, but activities that are better performed in tandem with each other, that should also be treated as a critical endeavour.

If we consider the BDE in light of the remarks on scholarly editions and interfaces, it becomes clear how the approach of genetic paths assigns the editor the role of textual curator. Consequently, the BDE can be seen as a manifestation of Dillen's argument for an editor as guide to help a user make sense of the content of an edition (above, section 1). But where Dillen suggests that the editor lay low, only to present herself when explicitly called upon, the BDE gives the editor a prominent platform. When it comes to the classification of the BDE in relation to a digital scholarly edition, it is easiest to start with a definition *ex negativo*. First of all, it cannot be defined as a derivative or spin-off of a digital scholarly edition, simply because the digital scholarly edition of *Sheherazade* is still under construction. Neither does it offer an exhaustive, critical representation to the complete text of *Sheherazade*. Yet, the BDE does have many characteristics of a digital scholarly edition: it is a fluid publication, it communicates findings of scholarly editing research according to a certain orientation to the text, and it offers a digital “surplus” that cannot be provided by an analogue platform. In fact, the BDE appears to fall under Pierazzo's definition of a digital scholarly edition as “an interpretative representation of historical documents which encompass a combination of primary sources surrogates, edited text(s), and tools

to exploit them” (Pierazzo 200). Within the field of museum studies, it can also be argued that museum itself is a “medium” – “a three-dimensional, multi-sensory, social medium in which knowledge is given spatial form. However, they are also themselves *full of media*” (Parry 11). From this perspective, this form of digital exhibit could then count as yet another “medium”.

Given the BDEs rather atypical position among the existing forms of scholarly outputs, and considering the audience with which it intends to communicate, we propose to classify it as an *interface*. As editing projects produce more than one interface for different audiences, the BDE is just one of the interfaces to Brulez’ *Sheherazade*, and the scholarly edition that is currently under construction at the CMG is simply another interface for another audience. Both interfaces are derived from the same texts, materials, and scholarly research activities regardless of who the audience might be. A digital exhibit is created for different purposes than a digital edition and this inevitably means that it enables a different form of user interaction. Editors typically create objects that are targeted at *readers* or *researchers*, but taking the museum as a metaphor and preparing digital objects for *visitors* might be useful to conceive the way in which we communicate and engage with broader publics. As a result, the overall research being done on Brulez at the CMG can be defined as a *project*; the BDE being one of the results and deliverables of the project.

5.2 Evaluation

Defining the BDE as an interface to a scholarly editing project further means that the principles discussed under section 1 should apply. In recap, it was suggested that a digital interface should be “generous” in the way it reveals the complex relationships of the content of the collection and in the way it is visually rewarding. Ideally, it also supports browsing at an enjoyable level and in intuitive ways. When it comes to scholarly editions, specifically, it is important that the edition’s dataset is not obscured and remains available, as it happens under open access or open source licenses. Moreover, it needs to be clear that the interface communicates a scholarly argument and that its workings inevitably influence how a user interacts with the material. This way, the editor becomes a guide who is, particularly in the case of the BDE, present to point out interesting aspects of a text that can otherwise only be appreciated after a thorough examination of the material and the writer’s creative process.

For the BDE as interface to comply with these principles, its dataset needed to be made available. As said, the exhibit is based on the CMG’s scholarly research and editorial work, but at the time of writing, the digital edition proper is not yet ready to be launched. In due time, the BDE will link to the edition – and vice versa – which will also provide the TEI/XML transcriptions and the project’s encoding

guidelines. As mentioned in section 3, the code that makes up the interface of the BDE will be made available in GitHub under a CC-license. It will be provided with documentation that, along with this article, describes the editorial orientation and objectives fundamental to its development. It remains to be seen whether this setup provides users with adequate means to sufficiently understand the functioning of the BDE and for reviewers or scholars to determine the efficiency of the BDE in communicating the textual genesis of *Sheherazade*. A second focal point is whether the way in which we provide access to the BDE's code will allow other (genetic) editors to "recycle" the format, or whether it turns out to be too idiosyncratic, that is, too attuned to Brulez' features. Because the code has not yet been made available online, the scope of the present article excludes such an evaluation of possible reuse. Nevertheless it would be valuable to compare other implementations of the *Sheherazade*-framework to assess its potency for communicating and disseminating textual genetic research.

6 Reflections and conclusions

It is a rare and precious opportunity for any scholarly editor to create a digital exhibition of their documentary material in collaboration with a specialist in web design. Apart from the obvious design expertise, the close collaboration with external partners from non-academic backgrounds has had several other consequences. First, it proves a useful instrument for reflecting upon the message one wants to convey. Working together with the designers from Prophets and having them as our first audience was a helpful way to learn to communicate about *Sheherazade*'s genesis. It provided an opportunity to better formulate and shape our editorial arguments and findings to a public of interested lay persons. As the creation of a digital exhibit is an iterative process of going back-and-forth between consultations, design, and testing, it is a good exercise in modelling. The modelling aspect occurs as well when identifying aspects of editorial research (and research findings) that are potentially of interest to an audience of non-experts. It encourages scholarly editors to think about ways to present their content and their argument in a clear manner – yet without oversimplifying them.

Secondly, it affects the role of the editor as textual curator. An exercise in modelling also is an exercise in restricting and, in our case, not each and every detail of *Sheherazade*'s *avant-texte* and Brulez' work methods can be included in the content of the BDE. In fact, the idea of having multiple interfaces may be soothing for editors that face the unfortunate task of limitation: a user's experience of the text would no longer rely completely on the functionality of one interface – depending on their interests and technical skills, users have at their disposal multiple entry-points to the edition's dataset. While the interfaces proper can be created together with other

parties, the editors are largely responsible for documenting the motivation behind their methods and objectives, and how the interfaces manipulate the edition's dataset. Another task for editors and textual scholars would be the evaluation of the interface: does it work as intended? Does it present users with an editorial perspective on the text, or does it provide users with tools for further explorations? As the topic "interface design" is relatively novel for the field of digital scholarly editing, it may well be that some of these questions are answered in the negative. A continuous self-evaluation, therefore, is crucial for further developments in this area. The situation is captured by Peter Shillingsburg, who notes that "attempts to see provisional or temporary relations and even harmonies in the complexity are not to be abandoned because perfection is not available to us" (Shillingsburg 23). While it is reasonable that a complex textual situation cannot be represented in a simple and uncomplicated manner, the representation needs to be understandable or else it misses its goal.

This paper set out to look critically at ways to communicate the specific aspects of textual genetic research to a wider public. The paper first looked at the general principles of interfaces for digital heritage collections and singled out some important issues regarding interfaces and scholarly editions. Where interfaces can be set up to present an all-encompassing and attractive overview of the collection, they can simultaneously steer or influence the user's engagement. When used to convey a scholarly argument and facilitate a certain use of the data, interfaces can also obscure or obstruct other uses. These risks can be addressed and significantly reduced by clearly communicating the scholarly argument(s) and by providing other ways – other interfaces – to access the edition's data.

The large collection of extant material combined with the materiality of Brulez' work method and the fact that the hard labour of writing and storytelling is one of the main themes of the work, makes *Sheherazade* an ideal case study for a genetically-oriented interface. In the documentary material of *Sheherazade* we find notes, manuscripts, typescripts – all with authorial revisions – that allow us to order the documents more or less chronologically, from a first moment of inspiration to a corrected page proof. Creating an interface that reflected the genetic orientation entailed, *inter alia*, a focus on the process of writing rather than on a "final" product. As a result, the BDE's interface was designed to bring forward the editorial presence by ordering the material as little storylines or pathways: these paths are our expert interpretations of Brulez' writing process. By highlighting certain material (documents, photographs, or musical fragments), the users are presented with the creative agencies that may influence the development of a literary text.

The case study has further shown that collaboration between scholarly editors and external partners to create a digital cultural artefact can result in something that is more than the sum of its parts and can resonate with different audiences. The interface design of the BDE has a far greater aesthetic appeal than what could be produced

in house at the CMG. The success of this shared enterprise will hopefully serve to highlight that working with commercial companies is not an inherently fraught filled pursuit for academic projects with funding limitations. The partnership with the *Letterenhuis* provided the rather expensive hardware for the installation, which to some extent compensated for the expense of outsourcing the design and development; and of course, it further provided the physical space in their exhibit area along with an audience for our scholarship.

The fourth section described in more detail how the BDE can be understood and classified as an ‘interface’ – one of possibly many interfaces for the *Sheherazade* research. If we take this interface as, on the one hand, reflecting a scholarly perspective and, on the other hand, influencing the ways in which a user can access an edition, it becomes clear how it defines the relationship between the editor and the user. In the case of the BDE, this relationship is one where both sides are active and present: the editor by setting out paths through the content; the user by clicking through the successive stages or, conversely, by deviating from the path. The interface should be deemed scholarly due to the rigour through which it has been created both in performing the genetic textual research, and through the process of curating the content and narrative. Accordingly, it can be deemed to be a “scholarly” output for a non-scholarly audience.

A pending issue is the evaluation of the BDE as a particular interface and digital artefact. The article discussed a number of ways in which such an evaluation can be supported, such as providing access to the scripts, documenting the digital framework, and clearly stating the scholarly intentions that led to its creation. But, as pointed out in section 4, the development of interfaces can benefit from more (and more diverse forms of) user testing. With regard to the BDE, we may decide to add further genetic paths to the exhibit in the future or to apply the software for use with another writer. It will be interesting to see whether the framework can be applied to other, but similar, use cases. If such applications are successful, this might contribute to the establishment of particular interface principles for the genetic orientation to text. To encourage reuse, users will be invited to download and implement the software as they see fit. In order to properly assess the reusability of the code, an open and ongoing dialogue on the topic is warranted, so we hopefully request that any forms of reuse are reported back to us.

The main goal of the BDE project was to communicate and disseminate textual genetic research to a non-expert audience. While the research can be complex, we found that there is little reason why the key findings cannot be understandable and accessible to more than a small community of dedicated scholars. The BDE is therefore intended to give users a chance to consider text from a genetic orientation, whilst keeping the threshold as minimal as possible. In order to attain this goal, the BDE needs to convey the dualism of the writing process, i.e. both its linear aspects and

its networked, “rhizomatic” nature. It attempts to let the user interact with both aspects, thus using the strengths of linear sequences (i.e. the genetic paths) as well as a complete and “generous” overview (i.e. the landing page as the writer’s desk). It was found that this particular mode of presentation can benefit the dissemination of genetic criticism because it presents an adequate representation of the concept of “text under development” without overburdening the user with information.

Typically, textual genetic scholars have a tendency to lose themselves in teleological hermeneutics: producing author-centered studies that appeal to exclusively to an audience of the converted. Yet the combination of text and images, of linear and networked, has the potential of engaging the user in “an act of imagination” (Sousanis 61). Similarly, the BDE combines the strengths of different modes of visualization (sequential and simultaneous), using the linear nature of the verbal expression in combination with the relational nature of the writing space. By using the appeal of multimedia content (digital facsimiles, images, music, video, and text), the end-user is engaged to become the associate of the editor, a “researcher in arms” as it were. She’s provided with an awareness of the diverse material that constitutes the *avant-texte* and the various ways in which this material can be interpreted. In the BDE, the user is the actor who animates words and images, and transforms a static presentation into something dynamic. As such, we hoped to convey our hypothesis regarding the genesis of *Sheherazade* in a meaningful way, and to bring to life the documents of the *avant-texte*.

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Digital Scholarly Editions and API Consuming Applications

Jeffrey C. Witt

Abstract

This article argues for the importance of a rigorous separation of the data of digital scholarly editions from the interfaces that display them. It is only when we are able to make such a separation, and in turn see our interfaces as API consuming applications, that we will be able to accommodate a plurality of innovative interfaces without redundancy and waste. As this paper will argue, the ability to make such a separation requires a dramatic rethinking of the essence of a scholarly edition. The article first introduces in abstract what this rethinking looks like and then looks at one attempt to actualize this theory in the case of the medieval scholastic corpus. Through a number of examples of ongoing work, this article shows how such a paradigm shift enables the efficient construction of interfaces and that, because of this efficiency, a plurality of interfaces can be swiftly constructed in order to satisfy a wide variety of research interests.

1 Introduction

The committee for the *Digital Scholarly Editions as Interfaces* conference offered the following opening question to help frame the meeting's discussion and focus:¹

Plurality in representation is a core feature of digital scholarly editions. How do interfaces realize this plurality? Do we need different interfaces for different target audiences (i.e. scholars, digital humanists, students, public)?

What stands out as particularly important here is the question of how we can promote plurality without redundancy. The ability to create a plurality of interfaces for any given dataset is a major advantage that the digital medium affords us. This ability allows us to imagine, design, and produce interfaces created to address specific research questions or expose particular features of a dataset. Without this ability, we must be content with a single reading environment that will necessarily choose a particular presentation that privileges some concerns over others.

¹ Call for papers: informationsmodellierung.uni-graz.at/de/neuigkeiten/detail/article/call-for-papers-digital-scholarly-editions-as-interfaces/

This potential, however, is threatened by an underlying publication paradigm, adopted by the majority of digital scholarly edition projects, that results in wasteful redundancy. Digital scholarly edition projects in which data and interface are tightly coupled and data is not easily representable in rival displays pushes us back to the paradigm of the print medium where form and content are inseparable. In such cases, when innovative re-representations require massive data re-acquisition, plurality becomes prohibitively expensive and this expense forces us to be content with massive unrealized potential.

In my own experience, working on the corpus of medieval Latin philosophical and theological texts, this kind of redundancy is an acute problem. Because the corpus in question is so large and data acquisition is so laborious, every redundant act is a threat to the dream of one day being able to study this corpus as a whole and to explore that corpus through a plurality of illuminating interfaces.

Yet today, despite a clear interest in the promise of digital scholarly editions, unaffordable and unsustainable redundancies abound in attempts to take advantage of this new medium. A quick survey of websites devoted to a medieval scholastic text or author reveals an unnecessary duplication of technology stacks that deliver very basic and common user functionality.² Such sites typically include a frontend design that offers the user a predictable set of options, e.g. *view text*, *view bibliography*, *view about page* and so on. Yet despite this repetition in basic functionality, each group is setting up an entirely new technology stack. In creating this stack, each group is creating their own idiosyncratic way of connecting their front end to a private and siloed datastore. Accordingly, once this data is created, it can only be experienced via the specific interface to which it has been attached. Any attempt to create a new, rival interface would be stymied by lack of access to the private datastore or by the overwhelming task of re-acquiring this data and populating a new datastore. In the end, what we generally find is that isolated research groups are currently choosing the most inefficient way possible to make data available on the web, while leaving us with results that go “barely beyond” the capabilities of the printed page.³

In short, the problem, as it currently stands, is that energy and resources are being poured into the creation of mediocre websites that do basically the same thing, rather than allowing energy to be poured into common libraries and common interfaces for

² See for example the sites dedicated to the following medieval thinkers: Peter of Candia (Duba), Jacobus de Altavilla (Brinzei et al.), Peter Auriol (Duba et al.), John Mirecourt (Parodi and Caccia Dominioni), and Richard Rufus of Cornwall (Wood et al.). These are just a few representative examples among many. Each interface repeats a basic pattern of varying quality. Likewise, each site independently creates a very similar backend to support this limited functionality. Further, despite the fact that the information on one site is highly related to the information on the other sites, connections between sites or data sharing is impossible.

³ The reference to going “barely beyond” is an explicit and conscious reference to the article by Joris van Zundert to be discussed below.

common presentations. Accordingly, the question that follows is: How do we stop making interfaces and digital scholarly editions that abound in redundancy? How do we, instead, prepare our data and editions in such a way that they enable the easy construction and maintenance of a plurality of interfaces that will, in turn, encourage the development of a plurality of exciting and revealing data presentations?

The solution to this problem of redundancy that prohibits plurality lies in a second question raised by the conference call for papers:

Can we conceptualize machines as users? How can we include application programming interfaces (APIs) in the discussion on digital scholarly editions as interfaces?

As I will try to show in this article and case study, it is only when we are able to separate our idea of a digital edition from the interfaces that display such an edition, and in turn see our interfaces as API consuming applications, that we will be able to accommodate plurality without redundancy. But this, as we will see, involves a dramatic rethinking of the essence of a scholarly edition.

In what follows, I first introduce in abstract what this rethinking looks like and then focus on one attempt to actualize this theory in the case of the medieval scholastic corpus. From here, I will turn to show, through a number of examples of ongoing work, how this paradigm shift helps us solve the problem of redundancy noted above. Here, we will be able to see how this approach enables the efficient construction of interfaces and that, because of this efficiency, a plurality of interfaces can be swiftly constructed in order to satisfy a wide variety of research interests.

2 *The text-as-network paradigm*

The idea that current progress in digital textual editing has moved “barely beyond the book” is the theme of Joris van Zundert’s enlightening paper of the same title that bemoans many of the grievances with the print paradigm aired above. He argues forcefully – with the help of Peter Robinson – that much of digital publication has only succeeded in reproducing this print paradigm in a new medium. He writes:

Most digital scholarly editions, in fact, are all but literal translations of a book into a non-book-oriented medium. Peter Robinson, writing about the distinctions of text-as-work and text-as-document, argues that in the early days of digital editions – roughly until 2005 – scholars would privilege the text-as-work perspective, focusing on the potential of digital technology to express and support the properties of text that construct its meaning. In recent years, he continues, this trend has been exactly reversed. More recent

digital scholarly editions harness the digital medium rather to represent the text-as-document – the faithful re-representation of a text according to its expression in the physical documents that carry it....Robinson also notes that many collaborative transcription systems are designed to record text-as-document: not one of twenty-one tools listed in a survey by Ben Brumfield offers the possibility of recording text-as-work. Indeed it is far easier to point to examples of digital scholarly editions that are in essence metaphors of the book, or in other words: translations of a print text to the digital medium, apparently for no other reason than to fulfil the same role as the print text. (Zundert 103–104)

To do something more, we need a fundamental shift away from the *text-as-document* paradigm toward what Zundert and Robinson refer to as the *text-as-work* paradigm, or what I will refer to as the *text-as-network* paradigm.⁴

For those familiar with the history of the web, Tim Berners-Lee, and the recent advance of Linked Open Data (Berners-Lee *Data*), some of this critique should feel familiar. Berners-Lee introduced the notion of Linked Open Data (LOD) by pointing out that the modern web, despite all its success, fails to live up to its true potential. For most people, the current web is a web of *documents*, a web of connected documents to be sure, but just documents. Berners-Lee, with Christian Bizer and Tom Heath, writes:

Despite the inarguable benefits the Web provides, until recently the same principles that enabled the Web of documents to flourish have not been applied to data. Traditionally, data published on the Web has been made available as raw dumps in formats such as CSV or XML, or marked up as HTML tables, sacrificing much of its structure and semantics. In the conventional hypertext Web, the nature of the relationship between two linked documents is implicit, as the data format, i.e. HTML, is not sufficiently expressive to enable individual entities described in a particular document to be connected by typed links to related entities. (Bizer 1)

Such a bland web, where data is intrinsically enmeshed with presentation (i.e. the hypertext markup language or HTML), makes it impossible for us to fully exploit the inferential capacities of modern computers. Berners-Lee's inspiration behind the proposal for Linked Open Data was the hope of creating a web of *data* (separated from any presentational form) standing behind the web of presentation-oriented *documents* that we regularly encounter on our computers screens. To Berners-Lee's proposal, we

⁴ Zundert and Robinson are not the only ones rethinking the relationship of a text idea to its material instantiation, and for further discussions along similar lines see Sahle *Mediengebundenheit; Transmedialisierung*.

should also note the current and ongoing work of Sarven Capadisli to promote and actualize the notion of Linked Research and to escape the research isolation inherent in the *text-as-document* paradigm (Capadisli). This work, in turn, continues to pursue Ted Nelson's dream of a linked global corpus as described in *Literary Machines* and before him the idea of the *Memex* machine put forward by Vannevar Bush.

The path towards a true scientific and holistic understanding of the scholastic corpus requires a similar paradigm shift. But it should be repeated once more that this shift has very little to do with a simple shift from the printed page to a website. This is merely a shift from one medium to another within the same paradigm. The shift in question involves a radical reconsideration of the essence of a text.

During the course of several years working on semantically encoded text editions, my own conception of what I am doing as a textual editor has dramatically shifted. Instead of seeing myself as engaged in the task of creating pages of text, I have come to see my primary task as one of identifying discrete data points and then documenting both the data types of these data points and the relationships between them. The editing of a paragraph, therefore, is not just the creation of a visible paragraph, but the recognition of a node that is the third child of the second section that has three preceding siblings and two following siblings. And of course, this tree structure is only one kind of networked representation. The same nodes can be re-used in other networks that can explore other kinds of relationships. For example, it is possible to recognize that the content of this node is a commentary on the content of another node in another commentary, which itself is a commentary on another text. In this way, a network can not only track the position of a node within the historical linear text, but also track the position of nodes within a common discussion taking place in multiple texts over centuries. As Berners-Lee remarked in his TED Talk on Linked Data: "Data is relationships". Thus, as a textual editor, I am first and foremost in the business of identifying and describing relationships between identifiable text parts.

It should be kept in mind that most of our modern computer applications work directly against such a realization. The common skeuomorphism of showing the "page" as we write in Microsoft Word is only the most obvious example of how our digital applications are still quietly and subtly forcing us to think about a text as a "thing" that lives on a page rather than as a network of related but highly diverse data types. Zundert describes this same phenomenon as "paradigmatic regression" exemplified in the metaphors used by GUI applications. He writes:

In order to help the user understand a new target domain or a new paradigm, it is expressed by way of a conceptual domain or a paradigm that is already known to the user. An obvious example is the metaphor of the desktop, which was used to communicate the functions of the PC to as broad an audience as possible. The only trouble is that such metaphors are necessarily incomplete

as they conceal both the good and the bad of the deeper computation model. (Zundert 86)

Given the pressure exerted by most document composition software, it will require an extra intentional effort to begin to think differently. This reconceptualization will only occur if we force ourselves to think about texts as data first, divorced from the page, book, or any visual representation of this data. The shift away from the *text-as-document* to *text-as-network* requires a revolution in how we think about our texts, our subsequent publication of this data, and the material artifacts (manuscripts, printed books, and digital display applications) that exists as temporary carriers of this data.

For example, the publication of a text edition should not be identified with the publication of a book or website or anything that a reader will encounter directly, precisely because this kind of presentation is already a derivative “representation” of the underlying network of relationships.⁵ Again, as Zundert notes, this demand seems to directly contradict current common practice:

Current reality, however, is very different. In textual scholarship, Internet nodes are mostly placeholders that point via a URL to a digital document or to a digital edition as a whole, as a data silo. The edition of the Van Gogh letters, for instance, sits at the node identified by <http://www.vangoghletters.org/vg/> as a fully integrated and monolithic pile of edited text from letters; the pile includes comments, annotations, translations and so on. The finest granularity presented to the network of the web is at the level of the individual letter (e.g. <http://vangoghletters.org/vg/letters/let043/letter.html>). Even that URL identifies a compound object, that is, a meaningful set of multiple scholarly objects: two facsimiles, a transcribed text, annotations, bound together by an interface that...represents an editorial argument about what constitutes the digital scholarly edition of this particular letter. According to this argument, there is no need to address the transcription, the facsimile, a particular annotation, in isolation. Most of the digital scholarly editions on the Web are expressed similarly. It is hardly better than a network of nodes in which each node represents a particular edition that is offered as a PDF. This situation renders it impossible to address texts (and thus editions) beyond their graphical interface in ways compatible with a hypertext model. (Zundert 101)

In contrast to this reality, it is imperative that the publication of a digital scholarly edition should coincide, first and foremost, with the publication of a granular dataset

⁵ On this point, see also Sahle’s notion of “transmedialization” (see Sahle *Mediengebundenheit*).

that reveals the underlying logic of the text network and is made accessible according to the best practices of the field and Linked Open Data. Thus, contrary to the practice of the Van Gogh edition as described by Zundert, resource identification should extend much further than to a *webpage* – emphasis is placed on the word *page* to note the “paradigmatic regression” to be fought against. As the *webpage* is itself just a unique compilation of a number of distinct resources, each of these resources should be identified and published as distinct nodes along with the relationships between these nodes. Each component – at the very least the idea of a paragraph, a division, the transcription of a paragraph, the image of a paragraph, etc. – should be a de-referenceable node that exists independent of any particular interface. Only with this kind of separation can the interface *page* referenced by Zundert be seen as a unique argument about how best to visualize the network of relationships between these text nodes. Moreover, only this separation will allow rival interfaces – a welcome and positive plurality – to make counter arguments about the proper representation of the logic inherent in the text network.

3 Editing and publishing via the *text-as-network* paradigm

The *Scholastic Commentaries and Texts Archive* (SCTA) (Witt et al.) is one example of an attempt to actualize the aspirations outlined above.⁶ The medieval scholastic tradition is a rich, vibrant, and highly influential corpus of philosophical and theological material. As noted above, the corpus is enormous, complex, and interconnected in complicated and fascinating ways. By connecting editorial work on this corpus into a global network of data, we will ultimately be able to gain a holistic perspective on the entire corpus. A prime example of the kinds of texts that belong to the scholastic tradition are the medieval commentaries on the twelfth-century book, the *Sentences* of Peter Lombard, known as *Sentences* commentaries.⁷ Lombard’s *Sentences* quickly became the preeminent theological and philosophical textbook in the high and late Middle Ages. Many of the greatest intellectuals of the Middle Ages wrote commentaries on this common textbook. Consequently, these commentaries constitute an enormous corpus that serves as a critical witness to the history of medieval philosophy and theology. Today, we know of approximately 1,000 such commentaries written from the 12th to the 16th century, each typically ranging from 1,000 to 3,000 pages in modern printed form. Further, *Sentences* commentaries only begin to scratch the surface of the wider tradition. To these should be added biblical commentaries, commentaries on Aristotle, *summae*, quodlibetal questions, logical treatises, and many other types. The SCTA is an attempt to publish this corpus

⁶ For a discussion of the early inspiration behind the SCTA, see Witt *Sentences*.

⁷ For an introduction to Lombard’s *Sentences*, see Rosemann.

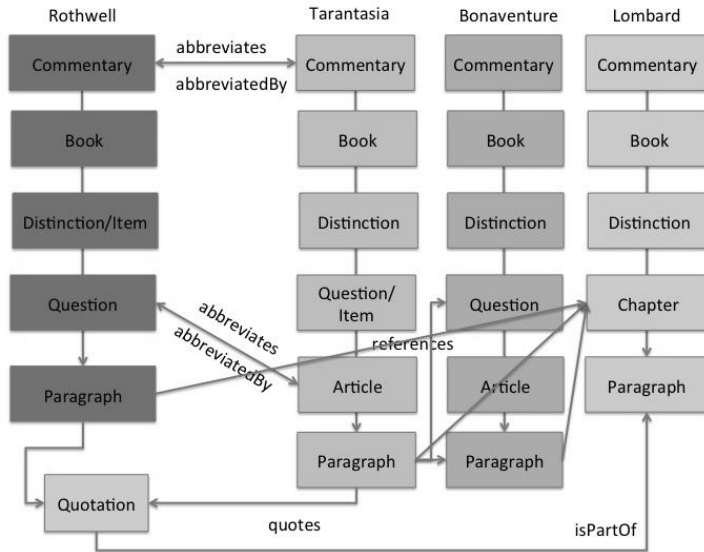


Figure 1: Example of Commentary Text Hierarchy and Relationships.

first and foremost as a data network that, when published according to an open and documented set of standards, can be endlessly re-purposed for an infinite number of purposes.

A critical part of this data organization and publication lies in the development of field standard data models that can make this data accessible in predictable ways to data consuming applications. In the context of the scholastic corpus, we face two major challenges when trying to model it in a presentation agnostic way.

First, we face the problem common to almost any critical project: namely, describing its generative history from its inception to its modern reception. This history abounds with distinct but highly related resources that an interface needs to be able to navigate in order to allow a user in turn to navigate massive amounts of data in an intelligible and citable way. We need to be able to identify and navigate between manuscript versions as well as early modern and contemporary printings of the same text.

Second, we face a problem perhaps more unique to scholastic philosophy and theology. This is the problem that scholastic texts constitute a highly intertextual corpus of non-linear texts. That is to say, every text is in some way making reference to discrete parts of other texts. As researchers, we need the ability both to display the traditional historical hierarchy, but also the flexibility to dynamically construct new

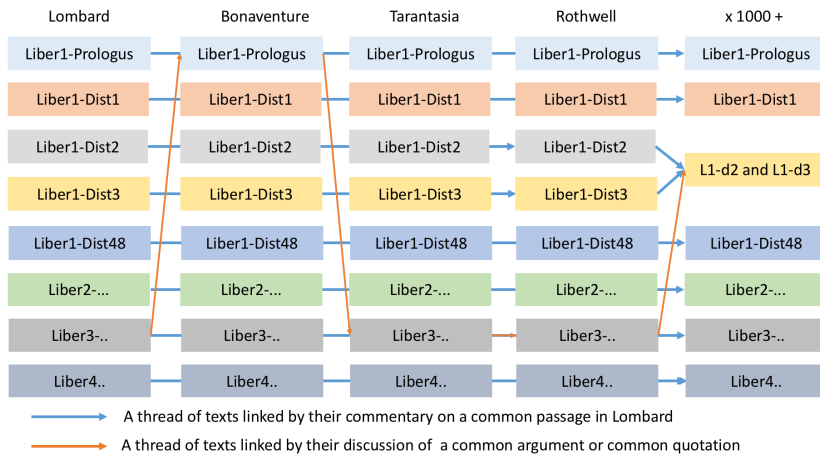


Figure 2: Example of Multiple Text Hierarchies in the Commentary Tradition.

hierarchies based on unique citation patterns or investigative queries. Below are just two examples that illustrate this latter need.

Figure 1 illustrates the fact that each commentary itself is a composition of an elaborate text hierarchy. Each hierarchy contains within itself hundreds if not thousands of relations to other text hierarchies. Further, these relations do not necessarily run through parallel units of the different commentaries' text hierarchies (e.g. from paragraph to paragraph), but can zigzag and crisscross from one level in one commentary to a completely different level in another commentary (e.g. a small paragraph in one commentary can reference a much larger distinction in another commentary or a medium sized article – containing multiple paragraphs – can be abbreviated by a single paragraph in another commentary).

Figure 2 illustrates the fact that because many of these texts exist within a larger commentary tradition, researchers often have an interest only in particular sections of any given commentary: e.g. a small identifiable section that discusses a common theme or argument throughout the history of the commentary tradition. Thus, we need the ability to categorize granular text units within a text's larger hierarchy as belonging to a thematic discussion. In this way, researchers can easily request, and systems can construct, new text hierarchies created from selecting particular text units from the entire corpus and arranging these units in a manner best suited to the research question at hand.

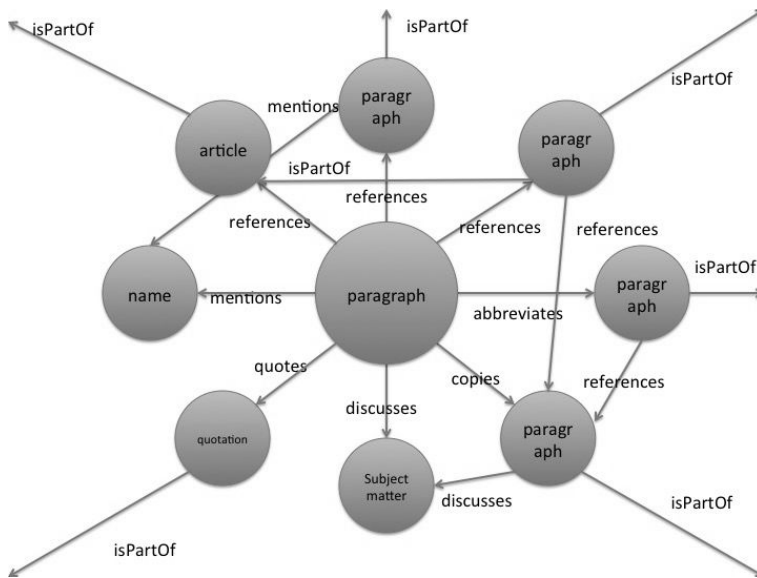


Figure 3: Simplified Example of a Text Network.

To solve these challenges, and in order to create a truly critical medieval scholastic corpus, the SCTA aims, first and foremost, not to publish a website, but to publish a dataset as RDF triples, such that every connected concept in the corpus has a de-referenceable ID through which it can be annotated with subsequent properties or annotations and linked to other resources. The result is something like the purposively simplified web seen in figure 3.

To solve the first challenge of modeling the generative history of our corpus, we have designed a model based off the Functional Requirements for Bibliographic Reference (Working Group on FRBR/CRM Dialogue) model that has been significantly modified and extended.⁸

⁸ For more information on FRBR, see Noerr et al. as well as Bennet et al. This approach shares similarities with, and indeed is partially inspired by, the model underlying the service known as Canonical Text Service (CTS), currently employed by the Homer Multitext (Blackwell and Smith) and Perseus. It is also an area of active development, evidenced by the ongoing efforts to update CTS to what is currently being called Distributed Text Services (DTS) (Almas et al.). Because there is so much active thinking and theorizing currently underway, the SCTA ontology offers us a chance to deviate slightly from existing models in order to meet the unique demands of the scholastic corpus. In the future, the SCTA will be working, wherever possible, to align this ontology with the recommendations of the CIDOC-CRM FRBROO model, while preserving its ability to adapt the model to meet the unique demands of the scholastic corpus. For a short write-up explaining a few of the reasons for our deviation from the CTS

The basic and most fundamental classes within this model are the following:

- WorkGroup
- Work
 - E.g. the idea of Moby Dick
- Expression
 - E.g. the idea of Melville's Expression (as opposed to a screen play Expression)
- Manifestation
 - E.g. the idea of the 1959 edition of Moby Dick
- Item
 - E.g. One physical copy of the 1959 edition in a particular library
- Transcription
 - E.g. the idea of a digital transcription of the 1959 edition of Moby Dick; includes properties like hasXML, hasJson, hasPlainText, hasHtml

Very briefly, we begin with a concept of WorkGroups that can contain other WorkGroups. But WorkGroups can also contain what FRBR calls Expressions which get us closest to the idea of the book or text we are generally familiar with. This might be the Expression of *Moby Dick* that Melville wrote or the Commentary on the *Sentences* that Thomas Aquinas wrote.

Expressions can then have Manifestations, which are roughly equivalent to the idea of various editions that have survived. A Manifestation might be the idea of a manuscript, or the Venice 1505 printing of a text, or the 1959 version of *Moby Dick*. A Manifestation has instances called Items and these Items live in physical spaces like a library.

To the FRBR model, we also add the concept of a Transcription. A Transcription is the idea of a digital representation of any Manifestation. It is not yet a file or file format, but a Transcription alone can take properties like hasXML which points to wherever the XML serialization of this transcription exists on the web, accessible via the HTTP protocol.

Finally, while the Manifestation is not yet something we can take a picture of, it is the idea of something physical. Thus, we can also create IDs for the idea of a "Manifestation Surface", that is, the idea of folio 1 recto, the idea of folio 2 verso. These Surfaces can then be connected to the "Item Surfaces" belonging to an actual physical codex possessed by a library. It is from here that we can make important connections to related web resources in a different but related model. This is the concept of a *IIIF Canvas* defined by the *International Image Interoperability Framework* (IIIF) API (IIIF Consortium). This API is widely adopted by world libraries for making images of

vocabulary and re-adoption of the FRBR vocabulary, see Witt (*Modelling*). This post originated as part of the discussion within the DTS working group about various modeling ontologies and became an argument for why the SCTA sees FRBR, with some modification, as an ideal modeling vocabulary.

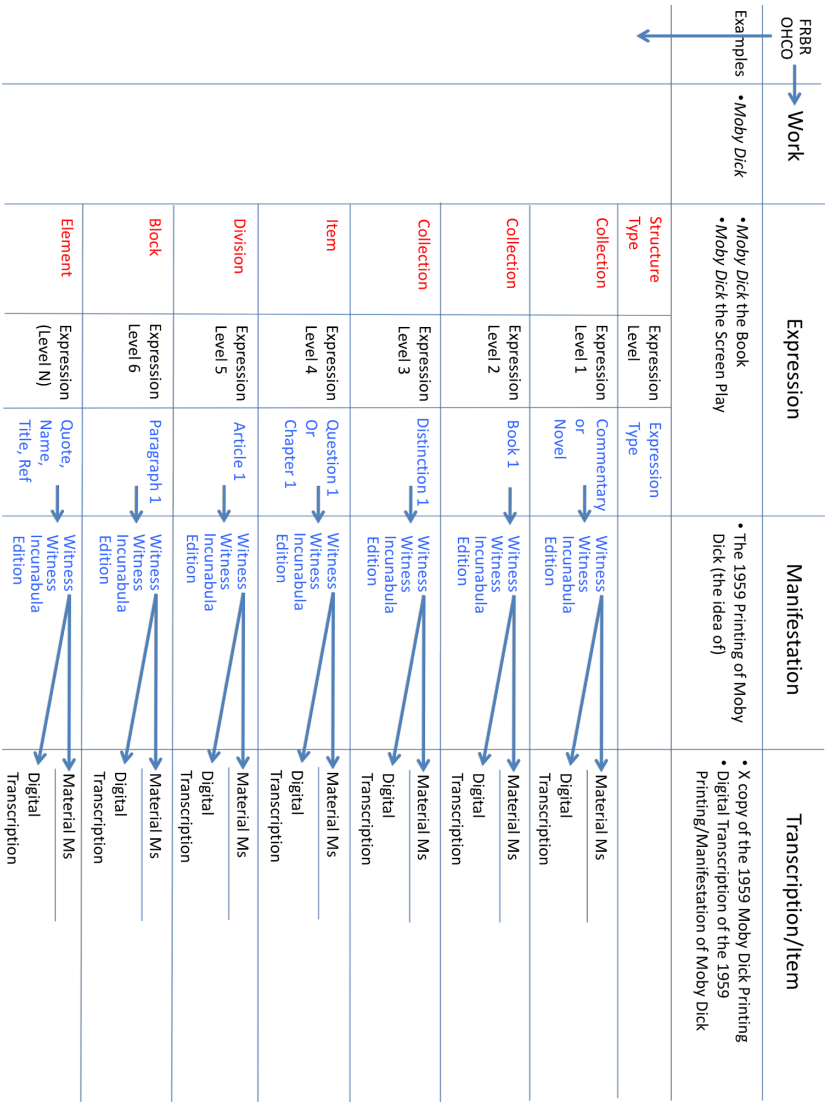


Figure 4: Text Network Matrix.

cultural heritage resources (in this case, manuscript folio images) available on the web.⁹

The basic classes used to connect out from the idea of a Manifestation Surface to the concept of a IIIF Canvas are as follows:

- Manifestation Surface
E.g. the idea of page 1 in the 1959 edition of Moby Dick
- Item Surface
E.g. the physical page 1 in a particular copy of the 1959 edition of Moby Dick
- IIIF Canvas
- IIIF Image Annotation
E.g. images taken of the physical page 1 in a particular copy

The SCTA's connection to the IIIF model and API means that a consuming application will be able to seamlessly move from a fragment of text to a related image hosted somewhere completely different on the web.

This, however, only models the generative history of our corpus, it does not help us with the tangled web of internal and external connections within the deep hierarchy of any given Expression. To meet this challenge, we break down our corpus vertically as well as horizontally. In other words, we conceive of each text as an *Ordered Hierarchy of Content Objects (OHCO)*,¹⁰ and accordingly create resource IDs for every division within the document hierarchy down to the individual paragraph and quotation level. Each resource, no matter how small within the hierarchy, gets further linked to the FRBR model as an Expression, Manifestation, Item, Transcription, etc. And each level of this hierarchy can be further annotated, so that, for example, we can identify any point in the hierarchy as an instance of a "Prologue". With these annotations, we can create new paths that slice through the corpus, taking only a cross section of a relevant section from each commentary or text. The result, as seen in figure 4, is a complicated matrix of relationships.

A similar matrix exists for Surfaces and their connections to each part of the text as seen below in figure 5. In this matrix, one can see that we have IDs not just for the image facsimile or the IIIF Canvas, but an ID for the Manifestation Surface, which itself is not something that one can take a picture of because it is still just an idea. From here we can link out to the actual physical Surface (an Item Surface) found in a particular Item (e.g. a single printed book). While, in the case of manuscripts, this relationship will be one-to-one, the conceptual separation of Manifestation Surface and Item Surface is particularly important when dealing with incunabula and printed books. In such cases, the Item Surface, which is a particular realization of the Manifestation

⁹ For a lengthier discussion of the model used for connecting Surfaces, Canvases and Zones to text Manifestations, see Witt *Surfaces*.

¹⁰ For an early discussion of OHCO, see DeRose.

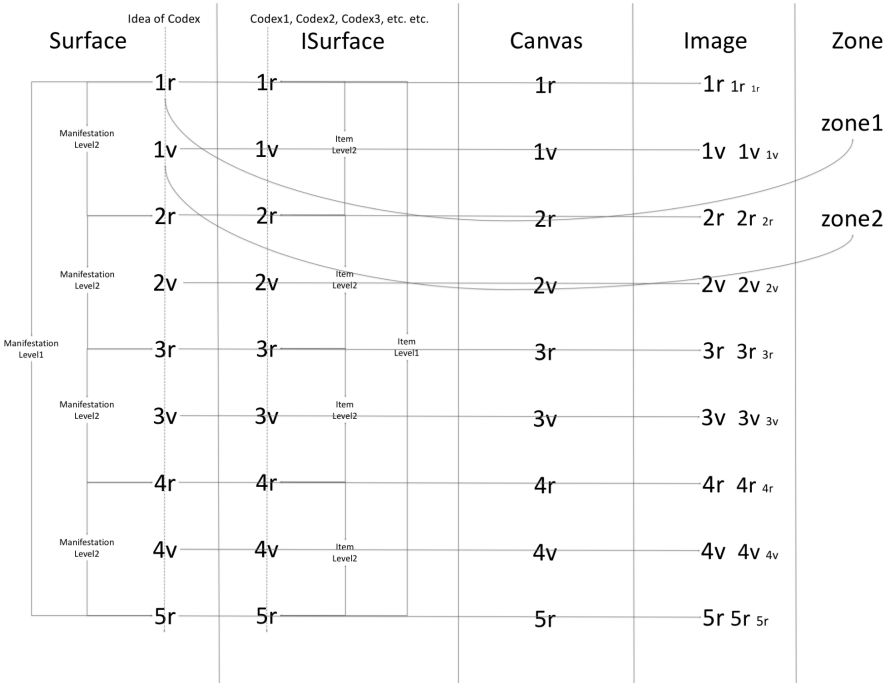


Figure 5: Text Network Surface and IIIF Canvas Matrix.

Surface, may have received unique written marginal notes, and we need to be able to distinguish this Surface from other Item Surfaces that realize the same Manifestation Surface. In such a case, we want to be able to link out to the IIIF Canvas ID for each unique Item Surface while still being able to group all of these Item Surfaces under the idea of a given Manifestation Surface. The matrix in figure 5 further shows how these Manifestation Surfaces can be identified with various parts of the Manifestation text hierarchy. Such connections ultimately allow interfaces to navigate between two overlapping hierarchies: the conceptual hierarchy of the text (e.g. books, chapters, sections, paragraphs, etc.) and the material hierarchy of the historical material carriers of these texts (e.g. codex, quire, bi-folio, folio, recto-verso, column, etc.)

Finally, with these models established, the SCTA can automatically construct the actual dataset by simply standardizing much of the work that critical editors are already doing. Even when an editor is focused simply on preparing a print edition, they are still engaged in precisely the kind of data creation needed to construct this data set, such as identifying manuscript witnesses, identifying structural units, and

developing transcriptions for each of these units. When these basic pieces of raw data are encoded according to a common field standard, such as a customization of TEI like the LombardPress-Schema (which the SCTA currently supports), we can automatically construct the data set described above. The result of this standardization means that the SCTA build script can crawl this data and construct the text network according to the models outlined above. The output of this build script at the present time is a database of more than eleven million triples and a fully indexed, searchable corpus of over ten million words.

4 Fulfilled promises: development efficiency and interface plurality

Because the SCTA publishes its texts first as a connected data network rather than as a text tightly bound to any presentational interface, such as a page, it is publicly available to anyone and any client that knows how to consume the API or query the public SPARQL endpoint. This allows the data to be efficiently reused in a number of different ways.

4.1 Common libraries

The first place we can see the payoff of this kind of data-first publication is in the newfound ability to build common code libraries that can be reused by interface developers to quickly navigate and query the resulting dataset.

One such library is the `lbp.rb` library. In keeping with the overall emphasis on decoupling distinct components, it is important to note that this library is a conceptually distinct component from the SCTA dataset. In other words, it is possible for many different libraries to be written that aim to consume this dataset in various ways. Another library might be written to access the network in a different way for a different purpose. It is for this reason that we do not refer to this as the SCTA ruby library, but the “lbp” (LombardPress) “rb” (ruby) library, which means this is a particular library designed by the LombardPress project to make use of SCTA data, implemented in the ruby programming language. Other groups interested in alternative languages can develop different libraries for other purposes and in alternative programming languages (such as Python, R, or javascript). In this way, we promote plurality. Yet, we also combat redundancy because, if the `lbp.rb` library works for a programmer’s present purpose, she has no need of re-writing the library. She can simply adopt the existing library and move on to the next programming task, saving a considerable amount of time in the process.

It is precisely this aspect of re-usability that makes many of the interfaces discussed below possible. The `lbp.rb` library is used repeatedly in many of these interfaces.

Because each interface can adopt this common library, developers can avoid redundant coding tasks and develop the specific interface more efficiently.

4.2 Scta.info

Scta.info is a specific kind of interface designed to visualize the logical connections that constitute the text network. In keeping with the paradigm shift described above, this visualization could be considered the real heart of the digital scholarly edition. Scta.info is a very simple interface that visualizes the logic of the text network in tables. This interface is designed for a particular purpose. Its primary purpose is to be used by subsequent interface designers in order to become familiar with the logic of the network so that they can exploit this logic when they build different interfaces.

4.3 LombardPress-Web

The LombardPress-Web Application is an interface that makes extensive use of the lbp.rb library and is primarily designed to show critical editions of scholastic texts within the context of diplomatic transcriptions and manuscript images. It is also the primary and flagship application designed to show how independent clients can make use of the SCTA SPARQL endpoint, the lbp.rb library, as well as the IIIF API to display texts and images that are distributed throughout the web.

The LombardPress-Web application is a “dumb client”, and it is important that this should be kept in mind. By “dumb” I mean simply that the application is completely agnostic to the data it displays. No text files or image files reside (or better, are *siloed*) on the server of this application. Nothing particular to this set or genre of texts is part of the hard code. Rather, it has been designed to understand a particular API and data model. Accordingly, any project that publishes their texts as a data network following the schema outlined above could reuse this client to view their data. The key take-away from this design is that not only is the data reusable in other clients, but the client, when de-coupled from a particular dataset, becomes reusable for a variety of datasets.

A quick tour of the LombardPress-Web application will illustrate some of the ways a client can exploit the logic of the text network.

Multiple text hierarchies

In figure 6, we see the display of the traditional text hierarchy for a given commentary. The client parses the URL for the RDF ID of the commentary in question, and then queries the SCTA SPARQL endpoint for the information it needs to display a basic table of contents.

The screenshot shows the SCTA web interface. At the top, the URL is `scta.lombardpress.org/text/questions/?resourceid=http://scta.info/resource/plaoulcommentary`. The interface is divided into several sections:

- Search Bar:** Located at the top left, with a "Search Corpus" button and a "Submit" button.
- Table of Questions:** A table with columns for "Principium", "Status of each lower level Expression", "In Progress", "build", "passing", and "View on GitHub". The table lists 10 items, each with a "draft" button.
- filter list:** A dropdown menu on the left side of the table.
- About:** A section on the right side, containing a "Search Text" input, a "Search" button, and an "Index" button. It also includes a "Commentary on the Sentences by Peter Plaoul" and a "Question Listed encoded by Jeffrey C. Witt".
- Related Articles:** A section at the bottom right, listing "About the Petrus Plaoul Edition", "Plaoul Biography", "Plaoul Timeline", "Plaoul Bibliography", and "Plaoul Manuscript List".

Annotations with arrows point to specific elements:

- "Lower level Expressions contained by the top level Expression" points to the "filter list" dropdown.
- "Expression resource ID" points to the URL parameter `http://scta.info/resource/plaoulcommentary`.
- "Expression description" points to the "About" section.

Figure 6: Traditional Text Hierarchy Display.

Figure 7 illustrates the way in which we can use this same interface to display non-traditional, non-linear hierarchies. In this case, the RDF ID given as a query parameter no longer corresponds to a Work or Expression, but to a specific category of a text part (what we call an *ExpressionType*) that occurs repeatedly within all commentaries of this type. In this example, the ID refers to the prologue of book 1 of all commentaries on the *Sentences* of Peter Lombard. Generally, each commentary contains several questions that fall within this type of text part and they all discuss themes of faith, theology, and science. When using this ID, the client creates a new text hierarchy and the user sees a new text that is effectively the result of cutting out sections of hundreds of texts and then arranging those sections according to a specified order (such as date or author name). In this way, a user has, in seconds, isolated a focused historical discussion that took place over centuries and until now was hidden within a multitude of much larger texts.

Negotiating multiple text manifestations

When a text part is selected, the client uses the SCTA database to locate an XML serialization of this section somewhere in the wider web, retrieves it, and displays it for the user in a fairly traditional way, as a document with an *apparatus fontium* and *apparatus criticus*. This visualization can be seen in figure 8.

SCA Lombard Press website showing a dynamically constructed text hierarchy display. The page lists various prologues and quaestiones under different authors like Gregory of Rimini and Henricus de Werl. Arrows point from annotations to specific elements: 'The RDF ID for the idea of a Sentences Commentary Prologue' points to a URL in the browser address bar; 'A new text hierarchy composed from all prologues in the Sentences Commentary Tradition' points to the list of prologues; 'Utrum theologia sit scientia' points to a specific entry under Hervaeus Natalis.

Figure 7: Dynamically Constructed Non-Traditional Text Hierarchy Display.

SCA Lombard Press website showing a critical text display. The page displays the text of "Lectio 1, de Fide" by Petrus Plaul. Arrows point from annotations to specific elements: "Links from corresponding Manifestation Surfaces to IIIF Canvas IDs" points to a list of IIIF IDs; "XML text retrieved for the canonicalManifestation of the designated Expression and then processed" points to the main text block; "Link to other available Manifestations (and Transcriptions) for this Expression" points to a link at the bottom of the text block; "Next and Previous values" points to navigation links at the bottom of the page.

Figure 8: Critical Text Display.

But even the traditional display in figure 8 is a good example of how the client is using the known network of relations between the various Manifestations of a given Expression to offer the user a default view of the text. In this example, the user only gives the client the ID for the abstract Expression of the Work. Without any prior knowledge of the text, the client uses the properties on this Expression to find the canonical or default Manifestation (from available Manifestations) of an Expression and then looks for the canonical or default Transcription of the canonical Manifestation.

If there is no critical text, the client will use the SCTA metadata to simply default to the best diplomatic transcription currently available. This ability to display whatever version of the text is currently available, while having the flexibility to modify or replace the canonical Manifestation when a new and better Transcription becomes available, has been tremendously useful for expanding the corpus quickly with what is available while also making room for improved quality over time. Because we have an ID for everything, we can take transcription contributions from everyone, no matter if they are just working on a single manuscript or a tiny section of a much larger text. While it may be extremely difficult for a novice or student to construct a perfect critical text, they may be able to produce a usable diplomatic transcription. Because we have a place for this diplomatic transcription, we can include it and make it available for use without having to wait for a perfect critical edition to be completed. For the time being, this usable edition will help provide search results and enable discovery. The ability to discover topics and themes in a text is the key to generating more interest. Later, as interests grow because of the early availability of these usable editions, other diplomatic transcriptions can be added and, eventually, a superior critical transcription can replace it as the canonical Manifestation.

Interacting with granular text units

Because we have IDs for every level of the document hierarchy, we can also use the network of relations (between Expression, Manifestation, and Transcription) to create functionality at granular levels. This can be seen, for example, in figure 9, where, for every paragraph Expression, we can request on-demand collations from the available Transcriptions of available Manifestations. When the request for a collation is made by the user, the client queries the SCTA endpoint for available Manifestations and populates two lists: a drop-down list for the base text and a drop-down list for the text version to be compared. When the selection is made, the client requests the canonical Transcriptions for the selected Manifestations, runs the collation algorithm, and returns visualized results.

Similar functionality is possible with respect to the available digital facsimiles for a given paragraph Expression. Figure 10 shows just one way a user can experience such

SCTA ▾ Text ▾ Search Corpus Submit About ▾ Donate Log in

Lectio 1, de Fide

[Quaestio: utrum in causa iudiciali fidei contra traditionem pure humanitus adinventam iudex idoneus ferret pro fide sententiam]

1 Circa prologum *Sententiarum* ^[1] in quo MAGISTER dicit quod intentionis suae est " munire Davidicam turrim vel potius munitam ostendere clypeis ^[2] " ^[a] etc, quaero istam quaestionem: utrum in ^[3] causa iudiciali fidei contra traditionem ^[4] pure humanitus adinventam iudex idoneus ferret pro fide sententiam.

Comments ▾ Manuscript Images Paragraph Text Tools ▾ How To Cite

Max ◀ 50% Min ▶ Close Lock Scroll Sync Panels

Base Text ▾ Comparison Text ▾ Generate

Base Text: reims

irca prologum Sententiarum magistri petri plaoui in quo magister dicit quod intentionis suae est munire davidicam turrim vel potius munitam ostendere clypeis etc. Quaero istam quaestionem Utrum causa iudiciali fidei contradictionem pure humanitus adinventam iudex idoneus ferret pro fide sententiam

Comparison: vat

Circa prologum sSententiarum magistri petri plaoui in quo magister dicit quod intentionis suae est munire turrim davidicam turrim vel potius munitam ostendere clypeis etc. Quaero istam quaestionem Utrum causa iudiciali fidei contra traditionem pure humanitus adinventam iudex idoneus ferret pro fide sententiam

Text Tool Bar Text Home Text Outline Previous Next Available Transcriptions Text Tools ◀

Figure 9: On-Demand Collation for Text Parts.


images. When a user asks to view the images for a given paragraph, a list is created – again with data from the SCTA database – of available Manifestations. When a particular Manifestation is selected, the SCTA is queried for which Zones belong to this Manifestation of this paragraph and which Surfaces these Zones fall on. From these Manifestation Surfaces, the query reaches out to the canonical Item Surface (or ISurface) and from here a connection to the IIIF Canvases minted by the holding library can be made. Finally, the IIIF Canvas leads to a URL at the hosting library where the actual image can be requested. Using the coordinates for the Zones in question and the IIIF Image API, only specific coordinate regions of the image are requested from the library server in question. The results of this image query are presented to the user as the image of one Manifestation of the target paragraph as seen in figure 10. If the user selects a different Manifestation, this query is repeated and a new image is requested from a different library server.¹¹


¹¹ Other kinds of granular functionality can be added as well, such as commenting and annotating text sections. See my post on how we are attempting to aggregate distributed discussions of a common resource using LinkedData Notifications (Social Web Working Group) (Witt *Linking*).

SCTA ▾ Text ▾ Search Corpus Submit About ▾ Donate

Lectio 1, de Fide


[Quaestio: utrum in causa iudiciali fidei contra traditionem pure humanitus adinventam iudex idoneus ferret pro fide sententiam]

1 Circa prologum *Sententiarum* ^[1] in quo MAGISTER dicit quod intentionis suae est " munire Davidicam turrim vel potius munitam ostendere clypeis ^[2] " ^[a] etc, quaero istam quaestionem: utrum in ^[3] causa iudiciali fidei contra traditionem ^[4] pure humanitus adinventam iudex idoneus ferret pro fide sententiam. 

Davidicam turrim vel potius munitam ostendere clypeis ^[2] " ^[a] etc, quaero istam quaestionem: utrum in ^[3] causa iudiciali fidei contra traditionem ^[4] pure humanitus adinventam iudex idoneus ferret pro fide sententiam. 

Max ▴ 50% Min ▾ Close Lock Scroll Sync Panels

Paragraph no. 1 | Navigate: Next | Select Another Witness: reims sorb svict vat



R1ra circa prologum
 *Sententiarum magistri petri
 * placui in quo magister dicit
 *quod intentionis suae est munire
 *davidicam turrim vel potius munitam
 *ostendere clypeis etc. Quaero istam
 *quaestionem Utrum causa iudiciali fidei contradictionem
 *pure humanitus adinventam iudex idoneus

Text Tool Bar Text Home Text Outline Previous Next Available Transcriptions

Figure 10: On-Demand Image Display for Text Parts.

Crawling the network

Finally, the client can exploit the many kinds of interconnections between texts and crawl the corpus in a non-linear way. Figure 11 offers a simple example of much grander possibilities. In this example, the user is reading the target passage of a given commentary. Upon requesting information about this passage – which is actually a request by the client interface to the SCTA database for more information about this resource – the client alerts the user to the fact that this small paragraph is actually an abbreviation of another text part in an entirely different commentary. The user can request to see this other text part without navigating away from the target text and can now read the abbreviating paragraph in the context of the text part it is abbreviating. This same kind of comparison, or contextual reading, can be extended to other kinds of text relations, such as *copies*, *references*, *quotes*, *discussions*, or, more generically, *isRelatedTo* as well as the inversion of these relations such as *isCopiedBy*, *isReferencedBy*, *isQuotedBy*, or *isDiscussedBy*.

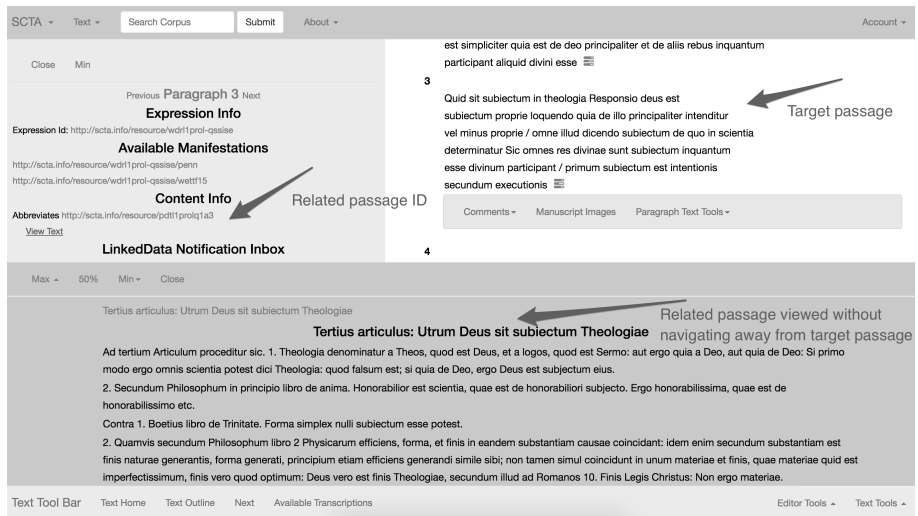


Figure 11: Navigation of Related Text Hierarchies.

Mirador

The LombardPress-Web client discussed above is an example of an interface designed for a particular purpose. For those people interested in displaying their data for such a purpose, we have severely reduced redundancy because there is now no need to reconstruct such an interface. Their focus, instead, should be on preparing their data according to the field standards and recommended data models so that it can be automatically displayed by a reusable client.

However, while this text-focused interface might be the preferred interface for some research questions and activities, it might not be the best interface for other concerns. There may be other research needs where the images of the manuscript witness should be front and center. If creating an alternative viewer required that the dataset be re-produced and that a new storage solution be created, this would be prohibitively expensive. But if the data can be reused, it becomes easy and trivial to offer alternative views.

This is precisely the case in the combination of the generic IIIF compliant viewer, called Mirador, with the SCTA dataset. Mirador, like LombardPress-Web, is a “dumb client” that is designed to understand a particular API, namely the IIIF API. Unlike the LombardPress-Web application, which is text-focused, Mirador focuses on images, or a digital representation of the material artifact, and views the text as a kind of annotation. If the scholastic corpus data were somehow welded to the LombardPress-

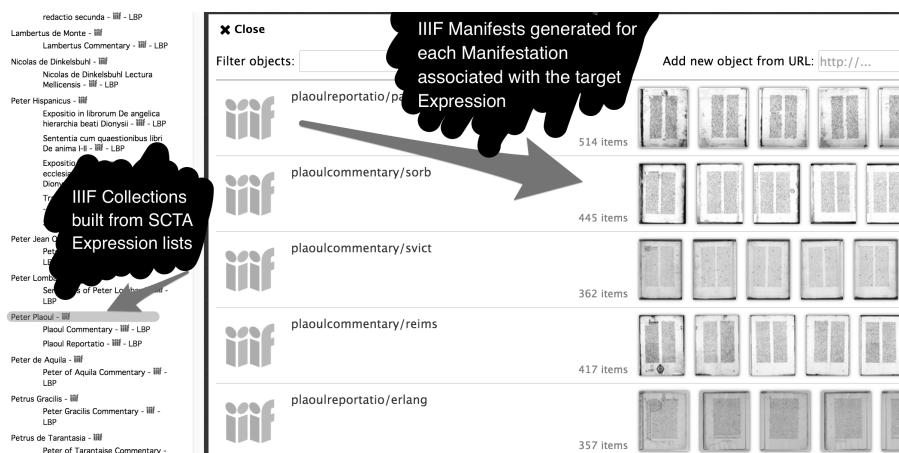


Figure 12: Mirador and IIIF Collection Display.

Web application, automatic reuse of this data for display in the Mirador viewer would be nearly impossible. However, because the SCTA is a separate public data service and the LombardPress-Web interface is just another dumb client, we can easily repurpose the same data to be exploited by a different interface. Figures 12, 13, and 14 offer an illustration of this data reuse.

Figure 12 shows how IIIF collections can be dynamically constructed from the SCTA concept of WorkGroups, Works, Expressions, and Manifestations – the very same data used by the LombardPress-Web application described above. Upon entering the interface, a top level IIIF collection is created for every author in the collection. Each author collection includes a sub-collection that corresponds to every Expression written by that author. When a user selects a particular author, a custom IIIF manifest is created for every Manifestation for every Expression attributed to that author. Each IIIF manifest includes the IIIF canvases for the folios or pages of the manuscript or book that correspond to Manifestations for every Expression attributed to the author in question. When a user selects a particular Expression, they see in return only IIIF manifests that correspond to the Manifestations for this particular Expression.¹²

Figure 13 shows us how the data used to create a basic table of contents for a text in figure 6 can be reused to create a table of contents for a specific manuscript.¹³ Figure 14 illustrates how the same diplomatic transcriptions used to create on-demand

¹² For a more detailed discussion of this kind of reuse of SCTA data, see Witt *Manifests*.

¹³ Another example of the reuse of this structural metadata by a completely separate client can be seen in the *Sentences Commentary Catalogue* (RCS) maintained by Ueli Zahnd at the University of Basel. For a write-up and description of this reuse, see Witt *Dataset*.

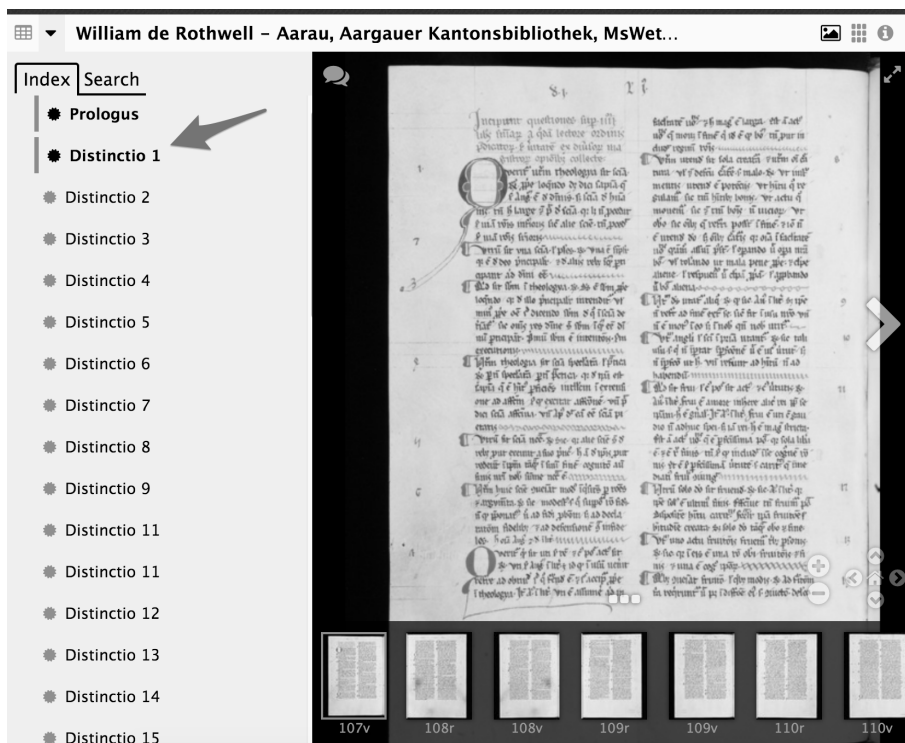


Figure 13: Mirador and Reuse of Text Hierarchy Data.

collations in the LombardPress-Web application seen in figure 9 can be used as the data for the navigation of a manuscript via search results in the Mirador application.

Once more, what it is critical here is the fact that none of this data has been recreated. It is identical to the data seen in the other viewer, it has simply been repurposed by a different interface. The data being produced for one visualization, because it has been decoupled and published separately from this visualization, is all we need to quickly and efficiently build rich manuscript viewing environments.

LombardPress-Print

Finally, because buy-in to the importance of the shift from *text-as-document* to *text-as-network* is so often hindered by those who remain exclusively interested in a codex manifestation of their editorial work, we need to do more to explode the false binary

The screenshot displays a web interface for the 'William de Rothwell - Aarau, Aargauer Kantonsbibliothek, MsWet...' collection. On the left, a search bar contains the text 'Augustinus', with a 'Submit' button below it. Below the search bar, the results are listed under the heading 'Search results for: Augustinus'. Three results are shown, each with a 'Canvas' label and a snippet of Latin text:

- Canvas 109r**: Utrum trinitas vere praedicatur de essentia Responsio sic propter omnimodam ydemptitatem identitatem essentiae ad totam trinitatem Idem AUGUSTINUS
- Canvas 109v**: Utrum genuerit eum natura Responsio sic quia est natura filius ut dicit AUGUSTINUS in littera quia generare est actus naturae
- Canvas 109v**: Utrum genuerit eum secundum rationem exemplaris vel ydea ideae Responsio aliquid procedere

An arrow points from the first result to a large preview of a manuscript page (Canvas 109r). The preview shows a two-column layout of Latin text in a Gothic script, with a large initial 'Q' in the left column. Below the preview, a row of thumbnails shows other manuscript pages, labeled 107v, 108r, 108v, 109r, 109v, 110r, and 110v.

Figure 14: Mirador and Reuse of Transcriptions as Manuscript Search Results.

between creating a digital edition or creating a physical book. This is a false choice. It is imperative that we understand that a printed book is just another interface that can and should be seen as separable from the underlying data-network.

Thus, I have made a prototype command line tool that allows a user to select any ID from the SCTA database and run a PDF conversion with a single command. This tool, once again leveraging the power of the common `lbp.rb` library, is able to access a text fragment of any part of the corpus from the cloud (that is, distributed anywhere on the web) and deliver a camera-ready print visualization. As seen in figure 15, a user does not need a prior knowledge of where on the web the source XML file is. She needs only the RDF ID of the text fragment in question. The command line tool will take this ID, crawl the text network, discover the source file, perform the conversion, and return the print-ready output.

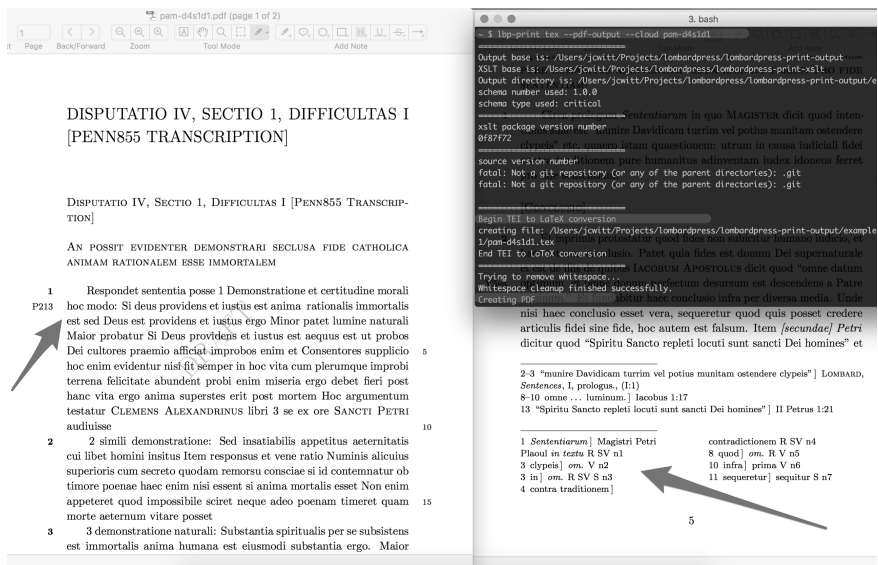


Figure 15: Data Reuse in Automatic Print Display Creation.

4.4 Conclusion

In closing, I return to the original question: how can we promote interface plurality without redundancy? This article is an attempt to show that the answer to this question is already technologically possible. The greater challenge is overcoming the social inertia of an academic culture that, despite protestations to the contrary, tends to be content with the existing paradigm: a paradigm that insists that a text is fundamentally a thing that belongs in a book and that any digital representation of this book should re-create this paradigm as closely as possible.

The hope behind the efforts described above is to offer enough early glimpses of what becomes possible when we understand our texts as networks of various interrelated data types so that scholars will begin to embrace this new way of thinking in mass. Such a transition will be difficult and will require scholars and researchers to learn new things rather than simply shrug off the tasks of data type recognition and encoding as someone else’s job. But this mental adjustment is a non-negotiable. If we want to achieve results such as those described above on a massive scale, a simple transition from print documents to a web of documents is not enough. In such cases, we will end up pouring money and resources into digital environments that take us nowhere. Instead, we must see, understand, and publish our texts first as

ideas divorced from any material presentation. Only then will we be able to efficiently and cost-effectively pursue a plurality of innovative interfaces that truly advance the pursuit of historical knowledge.

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Critical Editions and the Data Model as Interface

Hugh A. Cayless

Abstract

Critical editions of classical text pose some unique problems that highlight the importance of the editor's contribution to the creation of the edition. The article discusses the issues involved in creating these editions and proposes a method for creating digital critical editions that foregrounds the edition's data model, thereby enabling an intuitive and powerful interface for reading digital critical editions online. It presents the results of experiments with this method that are being undertaken by the Digital Latin Library project, a joint effort of the Society for Classical Studies, the Medieval Academy of America, and the Renaissance Society of America.

There are many interfaces involved in the creation and use of digital critical editions. Not just the ones presented to readers, but those in play in the data formats used and between the layers of software employed to render the "user interface". As a beginning, it is worth enumerating some of the functions of interfaces:

1. They hide implementation details and complexity.
2. They serve as a contract governing the interaction between two parties.
3. They serve as generalizable protocols.

These functions are obviously interrelated. Interfaces define rules for interaction between two parties (parties that may be human or machine). These rules pare down the set of things one party can ask another to do, and because they reduce that set of interactions, they (ideally) make for a reproducible and easy to learn protocol which can be used across a variety of similar systems. Critical editions, as they exist in Classics, have a relatively standard form: a text is presented at the top of the page, while at the foot, there are notes keyed to the line or other numbered section and to the specific word or phrase affected. These notes present variant forms found in the manuscript tradition of the text, the conjectures of previous editors, conjectures by the editor which they are not confident enough to place in the main text, and other notes that elucidate how the editor established the main text. As a very small example, take R.A.B. Mynors' Oxford Classical Text of Vergil's *Eclogues*, poem 1, line 59. The text has:

Ante leves ergo pascentur in aethere cerui
(Sooner then will the agile stags graze in the air)

and the apparatus has:

59 pascuntur P aethere] aequore Ribbeck e recc.

We are given the line number in question, then the variant form *pascuntur* (the present tense instead of the future, which is what the text has). ‘P’ indicates the manuscript *Vaticanus Palatinus lat. 1631*, we are told in the preface. Why we would care that P has the present tense is left unclear – most likely because P and R (*Vaticanus Vat. lat. 3867*, which has *pascentur*) are the only witnesses of the older manuscripts that have this poem, and so it is worth noting when they disagree. The present tense is not impossible, but the future makes better sense, and it continues in the next line. It is obvious in the apparatus what word in the line *pascuntur* would replace, so a lemma is not provided. In the next noted variant, however, we are given one, marked off with a right square bracket. The word ‘aequore’ (sea) was printed by Ribbeck in his 1859 Teubner edition, based on later (*recentiores*) manuscripts. The following line is ‘and the waves will leave the fish naked on the shore’ (*freta destituent nudos in litore pisces*), so one can see the appeal of ‘Sooner will the agile stags feed in the sea’. Even in just this single line of text and single line of apparatus, there is a lot of information. Apart from the fact of the variations, it all points elsewhere: if you do not know what ‘P’ denotes, you have to go and look it up, and likewise ‘Ribbeck’ and *recc.* both require external knowledge: the one of the publication history of the text and the other of how the editor uses the Latin abbreviation *recc.* as a siglum. It is defined in the *Sigla Codicum* of the edition as *codices saec. nono recentiores*, ‘more recent manuscripts from the ninth century’ – P is 4th or 5th century and R, 5th century. This kind of compression is absolutely typical in the critical apparatuses of Classical texts. Capital Latin letters are used for major manuscripts, lowercase Latin letters for less important ones or for families of manuscripts. Greek letters are used for theoretical, lost manuscripts from which extant ones are descended. Sometimes lowercase Greek letters represent families. These symbols are defined by the editor in the preface.¹

The interface of the printed edition gives us the bare facts of textual variation with pointers to fuller details elsewhere. But it also obeys our list of functions: it presents the reader with variants stripped of the underlying details; once the reader understands the apparatus’ “code”, they can simply note the alternate possibilities in passing or dig deeper; the form follows a pattern repeated in most similar editions, and uses conventions and abbreviations the reader will be familiar with (the bracketed lemma, and the single letter *siglum* for example). Printed apparatuses do vary between minimalist and maximalist poles (Tarrant ch. 7), that is between presenting only the notes that the editor considers necessary for the establishment of the text and

¹ Karl Maurer has a nice summary of the kinds of symbols and abbreviations used in critical apparatuses at udallasclassics.org/maurer_files/APPARATUSABBREVIATIONS.pdf. Accessed 16 March 2017.

presenting a fuller view of the tradition (Mynors' apparatus is a minimalist one). But the difference is mainly one of quantity and type of notes rather than form. A maximalist approach might list several variant spellings of a word, for example. A minimalist might argue that while this might be interesting to a student of the manuscript traditions, it does not actually help one read the text. There is a tension in this debate over what is better for the reader: simplicity and ease of use, or better access to the textual tradition with extra complexity. Should the editor work hard to reduce the interpretive burden of the reader, or try to get out of the way between the reader and the history of the text?

Our brief examination of the form of a printed text and apparatus immediately raises the question of what can (or should) then be done in a digital context with this kind of text. Freed from the spatial constraints of print, is there any reason to compress the information therein and to divert readers wanting more information elsewhere? Is there a justification for a minimalist approach to apparatus construction, or should we prefer maximalism, or even "totalism"? Why not record every known variant, whether significant or not? Moreover, we nowadays may have access to images of the manuscripts and to digitized copies of older editions. Why not present them as well, or at least link to them? It quickly becomes clear from this line of thinking that a digital critical edition has the potential to become a complex web application in its own right. And then the question becomes "where do we start?" There is an almost infinite variety to web applications and their expressions online.

The framework for the investigation of digital critical editions discussed here comes from the *Digital Latin Library* project (DLL), a collaborative effort of the Society for Classical Studies, the Medieval Academy of America, and the Renaissance Society of America. The DLL Project has a two-fold mission:

1. To publish and curate critical editions of Latin texts, of all types, from all eras, and to facilitate an ongoing scholarly conversation about these texts through open collaboration and annotation.
2. To facilitate the finding and, where openly available and accessible online, the reading of all texts written in Latin.

The first of these goals will be met by the creation of a Library of Digital Latin Texts, a series of new, born-digital critical editions to be published under the auspices of the aforementioned learned societies.²

The answer to the question of where to start, or at least the answer that the *Digital Latin Library* project has chosen, brings us back around to the topic of interfaces and to the realization that we have to be very careful about what we choose to adopt, copy, and invent. The tension between simplicity and complexity resurfaces again and again. As a pilot edition, the project's Principal Investigator, Sam Huskey, chose

² See digitallatin.org/about-project/mission-and-goals. Accessed 16 March 2017.

T. CALPURNI SICULI

BUCOLICA

I.

[Corydon, Ornytus]

- C. Nondum Solis equos declinis mitigat aestas,
 quamvis et madidis incumbant praela racemis
 et spument rauco ferventia musta susurro.
 cernis ut ecce pater quas tradidit, Ornyte, vaccae
 molle sub hirsuta latus explicuere genista? 5
 nos quoque vicinis cur non succedimus umbris?
 torrida cur solo defendimus ora galero?
- O. Hoc potius, frater Corydon, nemus, antra petamus
 ista patris Fauni, graciles ubi pinea denset
 silva comas rapidoque caput levat obvia soli, 10
 bullantes ubi fagus aquas radice sub ipsa
 protegit et ramis errantibus implicat umbras.

I 1 C. G P A φ Ulit. Wernsd. Glaeser sqq., omi. Nπχ p, O. εβγμρ edd. ante Glaeser. *nundum* G (corr. m¹) P. *declinis* N Heins. Schenkl, *declivis* G V edd., *declivus* Pp, *declives* u. 2 *quatinus φπηθ* r. *praeda* P. 3 om. κχ. *iniusta* P. 4 C. V plerique, edd. fere omnes ante Glaeser. *ornyte* Heins. Maehly Baehr. Schenkl, *ornite* N G V edd., *ornyce* P, *ornithe* s. *vaccae* εχλβραγγ edd., *vacoe* Ννφ πκμ rp, *bacoe* G, *vaccas* δ. 5 *molle sub* P V edd., *molliter* N G A H Glaeser Keene Jacoby (Woch. f. kl. Phil. III p. 1290), *molle per* Schenkl². *hirsuta* P, *hirsutam* Schenkl². *explicare* εγμλ¹δe. *genestra* λ¹δ, *genesta* εγμλ²χ² e Beck, *genistam* Schenkl². 6 *succedimus* G. *ulmis* nonnulli apud Titium. 8 O. om. N (add. m¹). *corydon* χεδρ² edd., *coridon* N G βνκλγμπρ¹φανr Barth., *corridon* P. *nemora* G (in mg.). *antra*-9 *ista* N G Glaeser sqq., *ista*-9 *antra* P V edd. ante Glaeser. 9 *gracilis* V (edd. vett. accusativos eiusmodi fere semper in *is* exhibent). *denset* G A P λ² Glaeser sqq., *densent* N, *densat* V edd. ante Glaeser. 10 *rabidoque* Baehr. (lect. lat. p. 35). *capud* G. 11 *bullentes* εδεδ², *bullantis* ηνφφ² rs, *palantes* Heins. *ubi* ut G (et in mg.). 12 *protegis* G (corr. m¹). *errantes* G. 13 *vacae*

Figure 1: Calpurnius' first eclogue.

Cesar Giarratano's 1910 edition of Calpurnius Siculus' *Bucolica*. A glance at the first page (fig. 1) is enough to show that Giarratano leaned well towards the maximalist end of the spectrum. Twelve lines of text merit sixteen lines of apparatus. This was good, because a more complex apparatus seemed likely to give whatever format we chose a better workout.

One of the first questions the project had to address was just how to format the data for its editions. Several options presented themselves. A relational database might serve well as a store for aligned collation tables of all the sources, for example. There are a number of scholars who have argued for using directed graphs where any version of the text can be constructed by following a particular path through the graph (Schmidt). These approaches both would tend to favor the maximalist approach, as well as more automation in the construction of the text. They should, in theory, scale up to many sources extremely well. To add a new source, the editor would transcribe it, tokenize it (turn it into a structure where each word is an atomic member), and align that tokenization with the main data structure, into which it could then be ingested.³ As Andrews argues, this kind of digital philology holds out a lot of promise as a means for investigating the textual tradition. What it does not necessarily do is point us at an interface for readers to interact with.

In a database or a variant graph, the qualitative aspects of the different witnesses – their worth as witnesses – will tend to be flattened. We can imagine a parallel system of metadata that provides weights or probability measures for variants, but such a system would entail a new and potentially formidable level of complexity. For the study of certain types of texts, this may not matter. If your object of study is how a text was variously presented, then not having, nor attempting to create an authoritative version is an advantage. But in Classics we are usually concerned with what the ancient author wrote, and less in how the text has changed over time except insofar as the patterns of change can hint at the original. This motivation necessarily involves privileging some witnesses over others.

Moreover, in the case of Classical texts, what we get from the textual tradition usually is not sufficient to understand what the ancient author wrote:

In almost all cases those writings have survived, if they have survived at all, only in copies many stages removed from the originals, copies of which not a single one is free from error. Often the errors are so great that it is no longer possible to tell what the author meant to say. (West 7–8)

In the case of Calpurnius, the best manuscripts we have date to the early 15th century. Calpurnius' dates are uncertain. He probably wrote during the reign of Nero (54–68 CE) but might have been as late as the 3rd century CE. Regardless of when he wrote

³ Many of these processes could be automated or crowd-sourced.

the original poems, however, the best evidence we have for his text comes from a time at least twice as far removed from the poet as from us! The best an editor of classical texts can do (in most cases) is to achieve a best-guess approximation of the original source. Conjecture is a necessary part of this process, as the sources may at times not provide any satisfactory readings at all. Because of the state of most classical texts, it is not enough just to produce a comprehensive snapshot of the textual tradition and hand that off to an unprepared reader.

On the other hand, having such data available to the reader of an edition would be a boon if they were interested in exploring the text's history. An interface supporting a multiplicity of varying sources might (in theory) enable the generation of an algorithmically "best" text, where each word displayed is the best-supported choice. It would also permit the reader to trace different threads of the manuscript tradition and see how those threads manifest in the text. It would offer the reader the chance to become more of an expert in that tradition, and to build their own versions of the text to suit their own needs.

We did not want to rule out this kind of approach to edition-making, but at the same time we felt that such work could not actually replace the traditional, editor-curated presentation of a text. Given that such an artifact was still a central requirement, we decided to focus on determining a suitable format for it and testing that format against Giarratano's complex apparatus. Because of the *DLL* project team's expertise with TEI, it was an obvious choice. Though it probably would not permit the representation of unlimited variance,⁴ we would be able to retro-convert existing, out-of-copyright editions (like Giarratano's 1910 edition) to digital form without having to start by breaking them up into their sources.⁵

A random sampling of Calpurnius' first eclogue (ll. 8–9) may provide us with a suitable example to work through:

O.	Hoc potius, frater Corydon, nemus, antra petamus ista patris Fauni,
O(rnytus):	Let's rather, brother Corydon, head for this wood those groves of father Faunus,

⁴ Schmidt's (2009) dismissal of TEI as a suitable format because of the problem of representing structural variance was premature, however, as we will see.

⁵ Even with a maximalist edition, much information from the sources has been discarded. It is impossible to automatically derive a fair representation of, e.g., P from the information given in Mynors' apparatus, and it would be impossible even with a maximalist edition. That being the case, one could not extract the data necessary to perform the workflow described above.

The apparatus in the new edition for these lines has:

8 O.] om. N (a.c.) Corydon] $\chi\epsilon\delta\rho^2$ edd. *coridon* NGβνκλγμπρ¹φαηρ Barth
1613 *corridon* P nemus] *nemora* (in mg.) G¹ antra] NG Glaeser sqq. *ista* PV
edd. ante Glaeser
9 ista] NG Glaeser sqq. *antra* PV edd. ante Glaeser

So, first N omits the speaker label (but the omission was corrected by the copyist), then there are a variety of different spellings of Corydon's name, G has *nemora* (the plural form) instead of *nemus*, and P, V, and editions before Glaeser's swap *antra* and *ista*.

The DLL edition models this with the following TEI:

```
<l n="8"><app>
  <lem xml:id="lem1.7-label"><label type="speaker">0.</label></lem>
  <rdg wit="#N" xml:id="rdg1.7-omission" ana="#subtractive"/>
  <witDetail wit="#N" target="#rdg1.7-omission" corresp="#rdg1.7-label"
    type="correction-original"/>
</app>Hoc potius, frater <app>
  <lem wit="#γ #ε #δ #ρ2" source="#edd.">Corydon</lem>
  <rdg wit="#N #G #β #ν #κ #λ #γ #μ #π #ρ1 #φ #α #η #ρ"
    source="#Barth1613" ana="#orthographical">coridon</rdg>
  <rdg wit="#P" ana="#orthographical">corridon</rdg>
</app>, <app>
  <lem>nemus</lem>
  <rdg wit="#G" ana="#morphological"><add place="margin">nemora</add></rdg>
</app>, <app type="transposition">
  <lem wit="#N #G" xml:id="l8a1lem1" require="#l9a1lem1">antra</lem>
  <wit><ref target="#Glaeser">Glaeser</ref> sqq.</wit>
  <rdg wit="#P #V" xml:id="l8a1rdg1" require="#l9a1rdg1"
    ana="#ordinal" copyOf="#l9a1lem1"/>
  <wit>edd. ante <ref target="#Glaeser">Glaeser</ref></wit>
</app> petamus</l>
<l n="9"><app type="transposition">
  <lem wit="#N #G" xml:id="l9a1lem1" require="#l8a1lem1">ista</lem>
  <wit><ref target="#Glaeser">Glaeser</ref> sqq.</wit>
  <rdg wit="#P #V" xml:id="l9a1rdg1" require="#l8a1rdg1"
    ana="#ordinal" copyOf="#l8a1lem1"/>
  <wit>edd. ante <ref target="#Glaeser">Glaeser</ref></wit>
</app> patris <persName ref="#Faunus">Fauni</persName> ...</l>
```

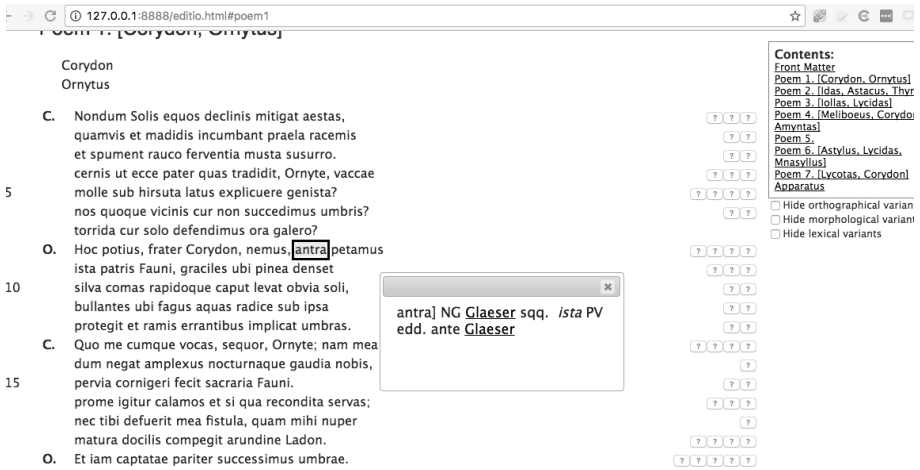
Again, there is a lot happening here. TEI's is actually a different data model than that of the printed edition: variations are placed inline rather than removed into notes, related features are linked rather than being represented in shorthand, and features that are implicit in the formatting of the print edition are made explicit and machine-actionable. TEI uses the app element to represent variation, so each entry in the printed apparatus will have a corresponding app. What is to be printed in the main text (if anything) goes in a child lem element, and variant readings go in

rdgs. So the speaker label that is missing in N goes in the lem, and its absence is represented by an empty rdg. The following witDetail signals that the omission was corrected. It is empty because this is a common feature of the text and the @type="correction-original" signals that when the apparatus is rendered, "(a.c.)" for *ante correctionem* will be printed (meaning the source had this reading before it was corrected). Conceptually then, this data structure places "O." and its absence at the same point in the text. Similarly, in the next entry, "*Corydon*" and the variant spellings "*coridon*" and "*corridon*" occupy the same notional place in the stream of text. In the next variant noted by Giarratano, G has *nemora* added in the margin, which DLL models using the add element. The final variant is the most interesting. NG have *antra...ista* and PV *ista...antra*, the same words, but inverted. This poses a problem of the sort that Schmidt and Colomb assert is more easily solved with a variant graph. But in fact, it poses very little difficulty for TEI, and even better, we can not only avoid the repetition of text with linking attributes,⁶ but we can use @require to note the interdependency between the two. We would not want to prefer the reading of NG and then PV in the next line, nor the reverse, as it would yield nonsense (*antra...antra* or *ista...ista*). If we prefer *ista* in line 8, then we must have *antra* in 9, and vice versa.

The TEI is obviously much more verbose than the compressed printed text and apparatus, but it goes well beyond the capabilities of print as well. Apparatus entries are categorized with @ana, meaning they can be filtered or searched on. Supporting manuscript witnesses and previous editions are linked to in @wit, @source, and wit elements, and other features like add and persName appear. Verbosity is often held up as a criticism of XML-based languages, but modern XML editors with smart autocomplete features make typing it not particularly onerous for an editor, and the fact that it can be parsed directly into a data structure for purposes of display and manipulation makes it extremely powerful. It is also important to remember that TEI's data model is not simply the tree structure that it gets from XML, but also the graph created by the use of its linking attributes (Cayless).

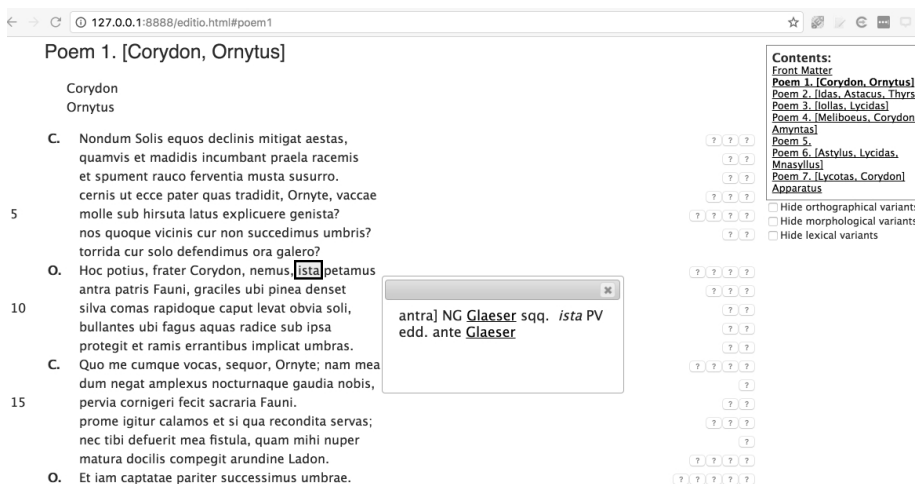
The majority of TEI-based web applications rely on transforming their TEI sources into HTML for display. Compared to TEI, HTML is a semantically impoverished language, so an XSLT transformation risks discarding information in the source. Indeed, the default behavior of an XSLT transform where there is no matching template for an element is to put the element's contents into the result, but discard the element itself, meaning that unless TEI elements are explicitly mapped to HTML, they will emerge from a transformation as plain text. Web browsers have long been happy to render pages with nonstandard elements, but the recently-published W3C *Custom Elements* Working Draft offers us a standard way to define our own

⁶ Schmidt and Colomb call @copyOf a "non-standard" attribute, but as a member of the set of global attributes, available on every TEI element, it could hardly be more standard.

Figure 2: *antra* selected.

elements and add custom appearance and behaviors to them. For our purposes, this means we can use slightly-modified TEI directly in the browser with CSS and JavaScript enhancements. We can leverage the TEI data model directly in the reading environment. The screenshots in figures 2 and 3 illustrate this process in action. Each variance in the text is flagged with a button in the margin. When clicked, the button opens a dialog box which allows the reader to select an alternate reading, which is then swapped into the text in place of the lemma. The reader is thus able to see directly how the text changes if they make a choice different from the editor's. In the first example, we see the default text, with the entry for *antra* in line 1.8 opened (fig. 2).

In the second, *ista* has been selected instead of *antra* (fig. 3). Because the lemmas and readings in lines 8 and 9 are linked with *@require*, when the reading in line 8 is selected, the corresponding reading in line 9 is also changed automatically. Swapping the two words does not much affect the sense of the lines, but it does allow the reader to directly experience the effect. The version Giarratano (and all editions starting with Glaeser's) prefers seems more poetic. The chiasmus, *Hoc ... nemus, antra ... ista*, is a typical poetic figure, and the placement of *antra* next to *nemus* both means the thought of line 8 is complete in itself and tends to intensify the common bucolic trope "Let's get out of the hot sun into the shade", leaving line 9 to expand on the thought. The rejected reading, *ista ... antra*, is a little simpler, and parallel to *Hoc ... nemus*. The ability to read these alternatives in place allows readers to experience both instead of having to mentally construct the version in the apparatus for themselves.

Figure 3: *ista* promoted to the text.

The web interface of the edition uses a JavaScript library called CETELcean,⁷ built by Raffaele Viglianti and myself, which takes a pointer to a TEI file on the web and loads it into the browser, making some changes along the way. The TEI namespace is removed, element names are prefixed with "tei-", as the Custom Elements specification demands, and the document is inserted into the body of the HTML page running CETELcean. Elements are either simply styled with CSS, or in the case of the TEI equivalents to HTML elements with special, predefined behaviors like links, the HTML is inserted alongside the TEI source, which is hidden.⁸ The result is HTML looking like the example below (the speaker label in line 8).

```
<tei-app data-teiname="app" id="id55">
  <tei-lem xml:id="lem1.7-label" id="lem1.7-label" data-teiname="lem">
    <tei-label type="speaker" data-teiname="label">O.</tei-label>
  </tei-lem>
  <tei-rdg wit="#N" xml:id="rdg1.7-omission" id="rdg1.7-omission"
    ana="#subtractive" data-teiname="rdg"></tei-rdg> <tei-witdetail wit="#N"
    target="#rdg1.7-omission" corresp="#rdg1.7-label"
    type="correction-original" data-teiname="witDetail">a.c.</tei-witdetail>
</tei-app>
```

A few additional points to note: elements with @xml:ids have them copied over as @xml:id and as plain @ids. Each element gets a new @data-teiname, which preserves

⁷ github.com/TEIC/CETELcean.

⁸ These include links (TEI ref and ptr) and tables, which have properties that cannot be controlled using CSS.

the name of the original element (crucially its case, which the browser's Document Object Model discards). Elements that will need to be addressed, like `app`, get assigned new `@ids` if they do not already have them. Like `@xml:ids`, `@xml:lang` attributes are copied into `HTML@lang`. All of the element's attributes are preserved. Besides relying on CETelcean, the DLL Viewer uses its own JavaScript to add the marginal apparatus controls, resolve any `@copyOf` references by writing the content of the target into the referring element, and to write out a traditional-style apparatus under the text. In some cases, we will wish to insert HTML content into a TEI element. TEI `ref` elements are one example, which function similarly to HTML hyperlinks. The easiest way to get the expected behavior from them is to insert an `` element inside the `tei-ref`. "Derivative" content like this is distinguished from original in two ways, depending on the browser's capabilities. If the browser supports Shadow DOM, which permits the insertion into an element of content to be displayed instead of the element's regular DOM content, then that is used. Otherwise, the original content (if any) is wrapped in an HTML `span` element with `display:none`; set so it will be invisible, and a copy of that content wrapped in an `` with the `@href` set to the `tei-ref`'s `@target`. Doing this keeps the original content available, in a consistent way, so that it can be serialized back to TEI XML.

Keeping the TEI data model around means that we can operate on it directly in the browser, and it turns out to be very useful. The functions that allow the swapping of apparatus lemmas and readings into the main text rely on using and manipulating the data model of the TEI text. If a reading is selected by clicking, the function simply converts the corresponding `tei-rdg` into a `tei-lem`, and the `tei-lem` into a `tei-rdg`. The page's CSS does the rest: `tei-rdg`'s present in the main text have `display:none`; set, and so are invisible and have no effect on the page's layout. Turning a `tei-lem` into a `tei-rdg` therefore makes it disappear, and the new `tei-lem` appears instead. Any lemmas or readings linked to the changed ones with `@require` or `@exclude` are automatically processed in turn, so that any dependencies are resolved. The DLL Viewer application thus roughly follows the model-view-controller model, where the model is the browser DOM, the view is the browser's view, governed by the application's CSS, and the controller is the DLL Viewer's JavaScript code.

Instead of requiring an XML transform via XSLT to HTML, the DLL Viewer entails the creation of a simple HTML web page, with links to CSS for displaying the transformed document content and a few lines of JavaScript to load the source document. Because it can be run simply from a web page, no server-side code is required at all. The DLL's project workflow for Calpurnius uses an HTML page in the Viewer's GitHub Pages site, which loads the source file from the GitHub repository in which it resides. Whenever changes are pushed to the project repository, those changes are automatically displayed in the corresponding Viewer page. Put simply, the technology enables a variety of collaborative, versioned editing workflows, which require very

little setup and which leverage existing systems to do their work. The workflow's simplicity means that the feedback loop between XML editing and review of the web presentation is very tight, allowing the editor to experiment with the encoding and to check whether it is compatible with the Viewer's interpretation.

This kind of feedback is very useful in helping clarify the decisions the editor has to make in encoding the text. For example,

```
<app>
  <lem>nocturna</lem>
  <rdg wit="#G" ana="#orthographical">noturna</rdg>
  <rdg wit="#N" ana="#additive"><add place="inRas">no<hi
    rend="superscript">c</hi>turna</add>que</rdg>
</app>
```

Here, the text has *nocturna*que. The *Codex Gaddianus* (G) has *noturna*que, and the *Codex Neapolitanus* (N) has an erasure before *-que* into which *nocturna* has been inserted. Giarratano has

*nocturna*que G, *no^cturna*que N(*no^cturna* in ras.).

Here we have a case where the encoding can represent the state of the variant more closely than the printed version could. The representation of that variant in the Viewer will be something like

nocturna] noturna G «no^cturna»que N

But this highlights an issue with the encoding and the functionality in the Viewer. Giarratano adopted a policy of recording every variation in G, as he felt he was the first to do a proper job of collating it. But does that mean *noturna*que is a viable reading for *nocturna*que? Not on the face of it, since *noturna* is not a Latin word. It could be argued, however, that having all of the variants from G means the *DLL* edition could display the edition with all of G's changes applied. It is important to recognize that this would not be the same as viewing G, as the text contains readings from other sources too. We might wonder too, whether «no^cturna»que is really a variant at all. It is possibly interesting as signaling that a misspelling like that of G was corrected in N, but it would be silly to promote it to the text. Perhaps, then, it would be better to encode these variants using note rather than *rdg* so that they are visible in the apparatus, but not able to be substituted for the correct reading. A similar case occurs on line 13:

Quo me cumque vocas, sequor, Ornyte; nam mea Leuce,
(Where you call me, I follow, Ornytus; for my Leuce, ...)

In the apparatus, we get

leuce NGAPπεχ² edd., *leute* καχ¹, *lene* φηρνθrs, *lance* γμ, *luce* b, *lauce* λδβ

as variants of the name of Corydon's beloved, Leuce (Λεύκη, literally "White Poplar", the name of one of the daughters of Oceanus). It is not surprising that copyists who did not know Greek might mangle her name in various ways, but it is also not especially helpful to know how it was mangled if you're just trying to read the text, and it is quite clear that 'Leuce' is correct. Again, the editor and encoder has to choose whether these variations are significant enough that they could be promoted to the text, or whether they should be confined to notes.

Tarrant, as a minimalist, would almost certainly argue that none of these variants should be represented in the apparatus at all. But the TEI data model permits us a middle ground between the maximalist and minimalist poles. We can record variants that are interesting because they provide support for an editor's choice of reading for the text, or because they represent previously unpublished information, or make a point about the transmission of the text, but that should not be able to make it into the text itself. Such a distinction could be made by recording the less-textually-significant variants as notes, or by otherwise classifying the apparatus entries and readings. The *LDLT Guidelines* already recommend such classifications, by means of the @ana attribute. Lexical, morphological, and orthographic variants are thus marked, and can be filtered out in the Viewer. We can thus, to an extent, accommodate both a maximalist and minimalist view of the text simultaneously.

The *LDLT Guidelines* have been released and continue to be revised, and the Viewer code is likewise in development in a publicly hosted repository.⁹ The goal for the current phase of Viewer development is to create a JavaScript library which can be plugged into any one of a variety of content management systems or web frameworks. Some issues remain to be resolved: since the current editorial workflow relies on a web page fetching the TEI XML from another site (a GitHub repository in this case), search engine indexing is problematic. Google will in some cases execute JavaScript embedded in a web page that builds page content, and then index the generated content rather than just the plain HTML. But experiments thus far do not hold out much promise for this working with Viewer pages. The alternative is to pre-transform the TEI into HTML Custom Elements and use the Viewer just to style the page. This approach will produce an indexable document, and does not discard any of the source's data model, so it is likely that the final version of the DLL's Library of Digital Latin Texts will take this approach.

Probably the greatest disadvantage of the approach we have taken is one shared with other TEI projects: to produce an edition, one must learn TEI. The unwillingness

⁹ See github.com/DigitalLatin/viewer. Accessed 16 March 2017.

to learn a new technology is frequently raised as an objection to textual scholars doing work like this. There are various ways to deal with it. One being to say that, just as one must learn to type into a word processor, or to format a bibliography, or collate manuscripts in order to produce a critical edition, they must learn to encode their texts to produce a digital critical edition. Handing the work over to an expert encoder is another option. And we may imagine that once the data patterns inherent in these editions have stabilized, interfaces that make their construction a little easier can be constructed. So, both human and technological solutions are possible. At this early stage, when we are still learning what needs to be represented, and how best to model it, we are planning to rely on a hands-on approach.

In the solution presented here, the user interface is constructed directly from the data model used by the editor, essentially acting as a “skin” over it rather than as a separate artifact derived from the source. We can activate or suppress different aspects of the edition as needed. This presents a marked advantage over print editions in which a very full critical apparatus, not to mention other types of apparatus that may be present, can actually compromise readability by breaking up the text too much. Editions where each page consists of a handful of lines of text followed by many lines of notes are not pleasant to use when one’s goal is simply to read the text. Furthermore, we can allow the user directly to manipulate the data model, and to see the effects of their experimentation at once. Besides the user-driven apparatus outlined in this paper, we have the opportunity to produce Linked Data-ready documents, where entities that appear across many digital resources are registered and linked. Persons, places, organizations, events, manuscripts, and other editions are some of the axes across which we can link editions to other web resources. The possibilities are practically endless, but that brings us back to the need for intuitive and well-understood interfaces to help our readers to navigate the editions we will produce.

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Evaluating the Interface

A Hybrid Focus Group for the Evaluation of Digital Scholarly Editions of Literary Authors

Federico Caria and Brigitte Mathiak

Abstract

Digital scholarly editions (DSEs) are becoming more and more important for the work of scholars in the humanities. Yet, little is known about how the end users benefit from DSEs in contrast to paper editions, which kinds of interfaces for digital editions are the most useful and how the user interface of digital editions can be improved systematically. In order to answer these questions, we collected qualitative and quantitative data through a user study with a hybrid focus group of humanities graduate students. Open task scenarios were designed to explore the usefulness of three DSEs. Our key result is that lack of usability can be a serious hurdle for users to effectively use the DSE. This leads the participants to prefer books over the DSE, although they do value the added benefits the DSE offers in terms of additional content.

1 Introduction

The use of digital scholarly editions is, hitherto, an underrepresented research area. While there are many reports on user studies for a variety of digital and physical resources, for example library information systems and digital archives, we found only few studies matching our topic of DSEs.¹ Yet, even cursory inspection of the subject matter reveals that not all digital editions are ideal in their usability, especially considering the high standard young users have, having grown up using professional websites from giants like Amazon and Google², which have all undergone extensive user testing and subsequent changes to the user interface. From watching what users do while interacting with the resources, e.g. through screen capture, and asking them

¹ Most of the studies focus on libraries (see Elina Leblanc's study on the usage of digital libraries fontegaia.hypotheses.org/1902/, which will be part of the same proceedings) and gather quantitative data, mainly through surveys (see Dot Porter, "What is an edition anyway?" and "Medievalists and the Scholarly Digital Edition.")

² "Our engineers have many ideas for ways to make your results more useful. But we don't go on a hunch or an expert opinion. We rely on extensive user testing and have a rigorous evaluation process to analyze metrics and decide whether to implement a proposed change. In 2016, we ran over 150,000 experiments, with trained external Search Evaluators and live user tests, resulting in more than 1600 improvements to Search." ("Focus on the user").

how they felt about the interaction, we can gain important information on how to improve a website, which helps us explain empirical data about user experiences with DSE gained through questionnaires. We are studying the use of digital scholarly editions by observing what users do whilst interacting with different editions. For this analysis, we chose three digital scholarly editions, designed tasks specific to these editions, confronted typical users with these tasks, and analysed the quality of use in relation to efficiency and effectiveness. The details of this experiment and its results are the main body of this paper.

2 Related literature

The literature behind this study encompasses different fields; in what follows, we condense the most relevant resources to the design of our test. Past user studies (on print and digital) were primary sources of information, together with the research on the information seeking and research behaviour of scientists in the Humanities and beyond. We reviewed user studies conducted on digital humanities resources (Warwick et al., *The LAIRAH project*), digital tools for historians (Gibbs and Owens) and digital editions (Porter, “Medievalists”; Kelly; Visconti; Santos), most of which provided us with precious quantitative insight. Despite the fact that the challenges that animate the digital librarian might significantly differ from those faced by users of digital scholarly editions, we have gained much insight by surveying user studies conducted on print and digital libraries. A further path of investigation was opened by Unsworth and the literature regarding the concept of primitives of the scholarly research (Palmer et al.). Building from this, we surveyed studies of information needs and information behaviour (Barrett; Belkin; Chu; Ellis), which are key to task analysis. Then, we moved from Drucker to adapt usability (Nielsen) in its extended version (Bevan), to the evaluation of DSEs as knowledge tools. Other authors have contributed to shape our approach, due to their previous engagement with the topic or the particular depth of their perspective. Among these are Ruecker et al., and Cooper et al.

3 Usability extended

Bevan provides the framework to “extend” usability from easiness to usefulness, measured as the extent to which a product can be used by specified users to achieve specified goals in a specified context of use. We used Bevan’s definition of usability as “quality of use” measured as effectiveness, efficiency and satisfaction. *Effectiveness* is the completeness and accuracy with which users achieve specified goals. *Efficiency* can be described as the speed (with accuracy) with which users can complete the

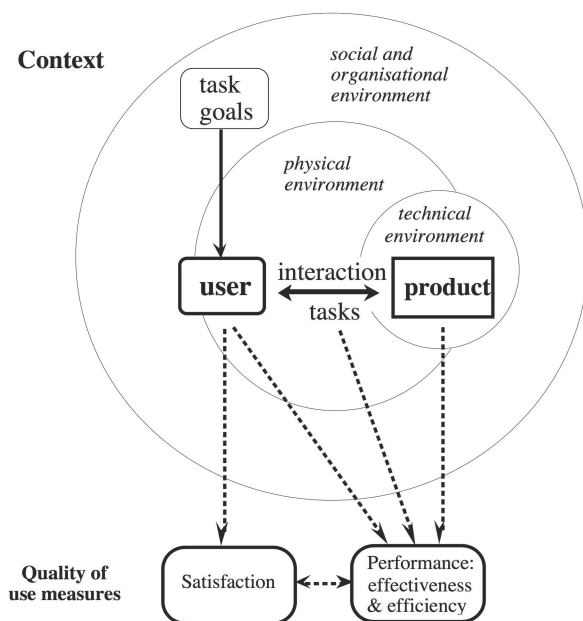


Figure 1: Extended Usability.

tasks for which they use the product. It is defined as the total resources expended in a task by ISO 9241³. *Satisfaction* is the comfort and acceptability of the work system for its users and other people affected by its use. An extended usability puts the usefulness of the website in the foreground where context, particular users, tasks and environments are all important variables of the assessment (see fig. 1).

4 The design of the experiment

In the following sections, we will give an overview of the general experimental design, the setting, the editions we studied, and why we selected them as well as, finally, the demographics of our focus group participants.

³ ISO 9241 is a multi-part standard from the International Organization for Standardisation (ISO) covering ergonomics of human-computer interaction.

4.1 A hybrid focus group approach

In a focus group, a small group of test subjects discusses their experience with the product and shares opinions, beliefs, and attitudes, while the moderator keeps the discussion on track. In our hybrid approach, we also give the participants questionnaires before and after the tests, and screen capture the task-performance, to collect both qualitative and quantitative data. The experiment's design is inspired by Nielsen's discount usability and guerrilla techniques regarding the recruitment of a limited number of participants, and the low time/cost of realisation; it can be potentially replicated more or less in any research context. Tasks are designed to let the users explore the media, retrieve content, compare records and interrelate information. The task scenarios are meant to reproduce a goal-oriented context of interaction, hence they are left open.

4.2 The setting

The experiment setting consists of a usability lab⁴, personal computers equipped with an open source tool⁵ to screen-record the performance of the tasks, an audio recorder to capture the final debriefing, paper and pen. We gathered 13 participants in a usability lab, asked them to perform research tasks in a given amount of time and give their feedback (Appendix I). An example task was to retrieve various kinds of information⁶ and compare the records. The feedback collected was of different kinds: a) a usability questionnaire, filled in for each edition after completing a series of tasks; b) an audio-taped discussion of the focus group. These data were coded together with demographics, the screen capture of the performance of the tasks and the participants' answers to the tasks to provide insight into design, usability issues and behavioural information.

4.3 Editions

We tested three DSEs: (1) *Saint Patrick's Confessio*, edited by Franz Fischer and Anthony Harvey, published in 2011; (2) *Walden: A Fluid Text Edition*, edited by Paul Schacht, published in 2014; and (3) *Emily Dickinson Archive*, edited by Leslie A. Morris, published in 2015. In developing a methodology to encompass the largest number of cases, we had to deal with sampling very different websites. After surveying the online catalogues of digital editions curated by Sahle (v 3.0, 2008–2011) and Franzini (2015), we took three resources among those which offered different solutions for

⁴ DigiLab, Università La Sapienza, Rome.

⁵ Cam studio – camstudio.org.

⁶ An example task for *Saint Patrick's Confessio* is to search for a word in the translation, open the passage in the editio princeps and justify the editor's choice.



SAINT PATRICK'S CONFESSIO

Read what St Patrick actually wrote in *his own words*

Home | Confessio/Epistola | Manuscripts/Prints | Special Features

Confession

1

My name is Patrick. I am a sinner, a simple country person, and the least of all believers. I am looked down upon by many. My father was Calpornius. He was a deacon; his father was Potitus, a priest, who lived at Bannavem Taburniae^[Nota]. His home was near there, and that is where I was taken prisoner. I was about sixteen at the time. At that time, I did not know the true God. I was taken into captivity in Ireland, along with thousands of others. We deserved this, because we had gone away from God, and did not keep his commandments. We would not listen to our priests, who advised us about how we could be saved^[Nota]. The Lord brought his strong anger upon us, and scattered us among many nations even to the ends of the earth. It was among foreigners that it was seen how little I was.

Figure 2: *Saint Patrick's Confessio* Homepage.

comparison tasks and stood out for their quality in terms of intuitiveness, interesting features and lack of obvious bugs.

1. *Saint Patrick's Confessio* (www.confessio.ie/) is a large project encompassing different layers of Patrick's tradition. The resource offers an edition of the leading Patrician scholar Ludwig Bieler, enriched with four different apparatuses, good quality facsimiles and palaeographical sources, translations, and additional information (see fig. 2).

2. *Walden: A Fluid Text Edition*⁷ (digitalthoreau.org/fluid-text-toc/) displays and compares the seven revisions of Thoreau's most famous work "Walden" with the Princeton edition. The edition is built around the *Versioning Machine*⁸ (Schreibman, 2002, 2010, 2016), redesigned for "Walden" by Leah Root, which allows uploading all the versions of the text on the one-page interface and comparing the text simultaneously (see fig. 3)

3. *Emily Dickinson Archive* [www.edickinson.org] is a digital archive containing Dickinson's manuscripts and a lexicon to explore the poet's imagery. The project, which offers high resolution scans of Dickinson's manuscripts alongside their best-known transcriptions, was produced by HUP in collaboration with Harvard's Houghton Library, the Berkman Center for Internet & Society, Amherst College, Bo-

⁷ The genetic edition of Thoreau's "Walden" *Digital Thoreau* is part of a larger web resource comprising three digital projects related to the work of Henry David Thoreau.

⁸ v-machine.org.

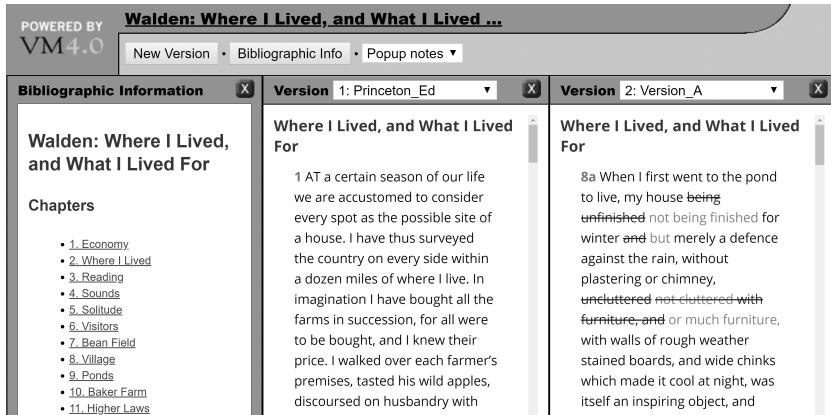


Figure 3: “Walden” Fluid Text Edition Homepage.

ston Public Library, and nearly a dozen other partners. The project shows manuscripts and transcriptions side-by-side (see fig. 4).

For *St. Patrick’s Confessio* and *Walden: A Fluid Text Edition*, we were able to clear up some questions with the developers; unfortunately, that was not possible for the *Emily Dickinson Archive*, since the editors did not reply to our questions.

5 Participants

For this kind of quality test, university students are among the best participants that can be found. On the one hand, they are relatively easy to engage, on the other hand, being not involved in any DH projects they do not bias the evaluation. This is a key point since we are not interested in assessing the scientific quality of the projects, but their quality of use, which is only loosely connected to the user-perceived scholarly value. Since this kind of analysis involves some form of co-operative evaluation, requiring active intervention from an observer, in order to probe usability problems with the user we tried to minimise the noise emanating from having personal knowledge of the history of the DSE.

Our ideal tester, therefore, had only two requirements: (1) to be confident with the information tasks typical of scholarly research⁹, and (2) to be internet-savvy. Our

⁹ The information-seeking behavior of faculty members has “substantial areas of overlap” with graduate students, PhD candidates and researchers, according to Barrett (329). Similarly, Warwick (3) observes that the way scholars “use digital resources is, in fact, closer to the way that the average, nonacademic user interacts with digital or printed information. Most of us read for pleasure, may consult a wide

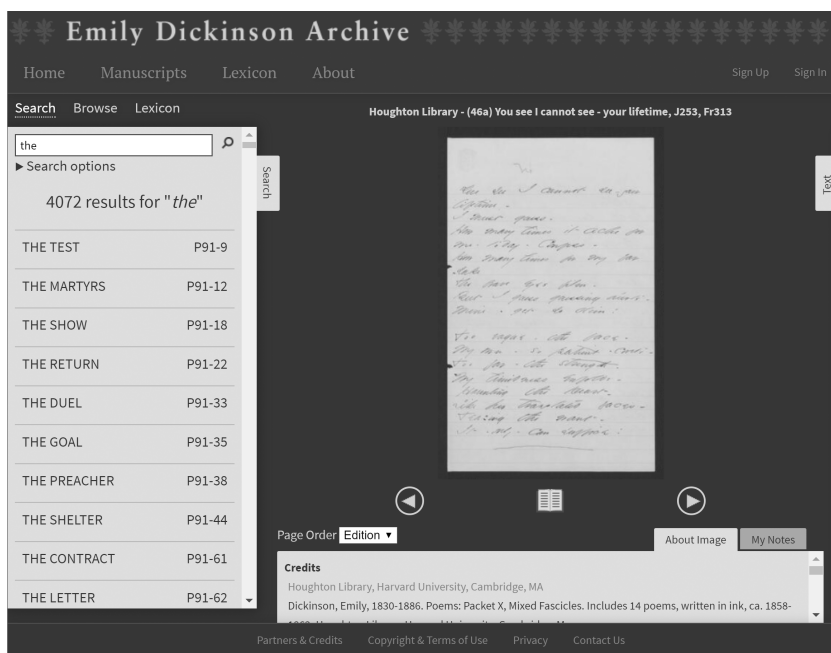


Figure 4: Emily Dickinson Archive Homepage.

participants ranged in age from 22–25, the majority of them were pursuing an MA in Philology and Literary Studies at the University of Rome, La Sapienza. Two were yet to receive their BA in Philology, but they were also experienced in scholarly research via their BA theses. Their computer skills ranged from medium to high, gauging from their self-evaluations on a scale from 1 to 7.

6 Results¹⁰

6.1 Satisfaction questionnaire

Participants were asked to fill in a satisfaction questionnaire for each DSE after completing the tasks (Appendix II). The questionnaire is adapted from WAMMI¹¹ and

range of information resources and don't conduct systematic keyword searches of recently published scientific literature; thus, a study of humanities user needs may also produce important results relevant to nonprofessional digital resource use."

¹⁰ The full dataset can be found at doi.org/10.5281/zenodo.803634.

¹¹ WAMMI is a professional website analysis service for measuring user experience - www.wammi.com.

Koohang, focusing on the need to capture participants' immediate felt experience right after performing the tasks. The main results of the study are that (a) the *Walden: A Fluid Text Edition* was deemed most satisfactory among users; (b) the perceived usefulness of the three editions is nearly 100%, as the questionnaire results show (see Appendix II).

Results

The *Walden* edition gained the highest score. Among the features that seem to distinguish *Walden* from the other websites are learnability, ease of use, and navigation. As Appendix II shows 10/13 said they felt efficient while using it; 9/13 felt they were in control. On the whole, our testers expressed an overwhelming preference for the *Walden* edition, due to meeting their expectations (11/13) and better supporting research (10/13), in particular through navigation (11/13).

Perceived usefulness

The perceived usefulness of all three digital scholarly editions was 12/13 or 13/13 (see Appendix II/8). All participants stated that the three websites were valuable academic resources, and that they would become proficient in their use, although the learnability of the websites was sometimes sub-optimal.

6.2 Best features and suggestions

During the focus group discussion, participants were asked to verbalise which function they thought was the best, and to suggest improvements. We compared their responses in order to gain deeper insight into what is desirable in a DSE as well as the major problems that our testers had to face.

St. Patrick's Confessio: the critical apparatus, the presence of translations, and the quality of the facsimiles were among the best features listed by the participants. Improvements were mostly related to accessing the content (to guidelines, the stemma, the key, etc.). Another recurring theme is the "search function" which "should be made more visible", or "included in the research flow". As for the apparatus, participants very much liked the structure, but would prefer it to be linked to the movement of the cursor over the text.

Walden: A Fluid Text Edition: The most important characteristics that we have found were "simultaneous comparison", "colours", and "clear"; the first two refer to the multi-version display and the colour coding, the last to guidelines and content. None of the participants understood the difference between pop up notes and inline notes. Among the suggested improvements were the need to add facsimiles, and the visibility of the button to open a new version window.

Emily Dickinson Archive: The best features mentioned were the ability to access materials from different perspectives, the presence of high quality facsimiles, and the lexicon. Participants suggested adding more guidelines, and the ability to compare between different versions of the text.

6.3 Retrospective probing

The final group discussions¹² of the panel were audio taped, transcribed and coded. Their aim is to expand issues relating to usefulness based on a set of open questions, where participants were asked to draw on their experience in navigating, retrieving, searching, and collecting information from the websites and to assess their efficiency in doing so.

The *Walden* edition offers the experience in terms of easiness, navigability, and control; it “is the most intuitive thing ever seen” (P1); “I felt less [like an] idiot” (P12); it offers the “most efficient way to compare” (P8); “it is definitely a resource that I would need” for my research (P5); if one needs to compare different versions “it is super useful” (P6); “no doubt it” is a good tool for research (P2). Participants found the colour-coding helpful as it allowed them to spot parallels across several columns or provided additional palaeographic information. The *Walden* edition was also preferred when it came to quickly accessing the texts and understanding their content. We should point out that only a few testers could correctly open a new window – this task is in some ways fundamental to explore the functionality of the comparison tool, which is one example of a multiple-version display that allows for simultaneous comparisons of up to 8 versions on the screen. Most participants did not find the button so that the moderator had to help, suggesting where to click while the task was going on (instead of opening a new browser window as many participants did). Apparently, this issue did not influence participants’ opinions as to which was the best website.

The *St. Patrick* edition was mainly perceived as a complex tool. Our data show that participants did not feel that navigating the large hypertext, or accessing or retrieving information, was efficient. Phrases such as “[i]t was difficult to find” or “I could not find” occurred far more often in relation to the *Patrick* edition and the *Dickinson Archive*. While most participants “did not feel to find what I wanted”, over half reported problems in navigating: “I did not understand how to move” or “didn’t know where to go”. “I had the impression of moving back and forward”, “I could never get back to the stemma” (after finding it by chance) were also recurring expressions of frustration (see fig. 5).

¹² We ran four groups with a maximum 4 participants each. The four discussions were audio taped, translated into English and analysed together, using atlas.ti - .

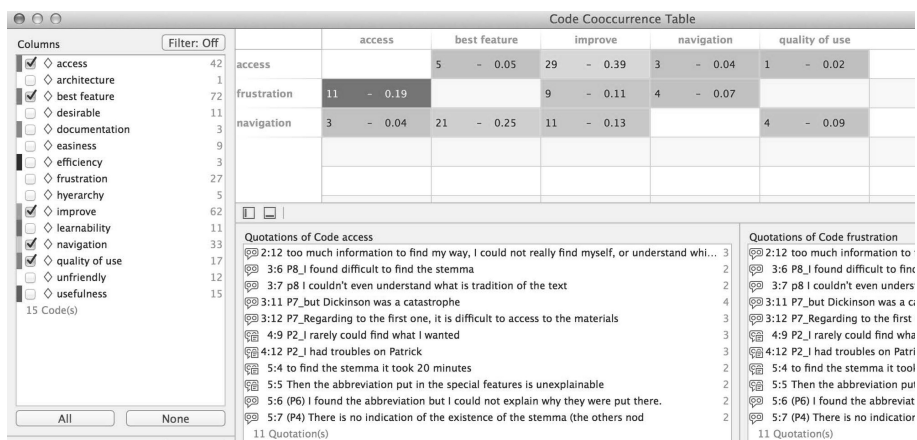


Figure 5: Coding - frustration and retrieval.

Among the closest matches between the terms “best features” and “access” were the *Dickinson* edition’s multiple access feature (searching facsimiles for title and location of originals), and the lexicon, which is “useful to study the poet’s style.” On the whole, we got fewer comments on the *Dickinson Archive*. Participants mentioned the digital archive when talking about their research habits. In essence, according to them, the *Dickinson Archive* should rather be considered “the outsider, due to not being an [sic] scholarly edition”: according to our testers, “resources like *Dickinson Archive* are something that we already have, big libraries are doing this!” which “is a nice approach! They make available things without interpreting so that philologists can use them”. On more than one occasion, the group demonstrated their awareness of the added value that digitizing facsimiles and making them available represents to scholarly research, although “personally going to check manuscripts in the library is what a specialist would and should do”. “Editors do not build digital archives, archives are ‘only a preliminary activity’ (on which philologists build editions)”.

6.4 Comparison to printed editions

Participant’s information-seeking and research habits were very much rooted in the print tradition. From this point of view, expressions like “digital editions are not the only instruments, they must be integrated with printed resources”, or “I would go to a library to personally check manuscripts, not on a website!” or “tools like *Patrick* edition and *Walden* edition are absolutely marginal instruments” may perhaps be explainable. “We prefer to see texts like in *Dickinson Archive*”, said one to stress the

important role facsimiles play in their research practice, where digital resources play only a small part. “Perhaps, putting facsimiles on the second (*Walden* edition) would completely change the website, it would become an extremely valid resource” said another. “So what if *Walden* edition would have facsimiles?” asked the moderator, “Then it could be very, very useful... although I would not entirely rely on it”.

6.5 Effectiveness

According to the extended usability definition, the quality of use is measured as efficiency, effectiveness and satisfaction. Thus far, we have focused on (1) data from the satisfaction questionnaire; (2) our testers’ perceived experience recorded in the final discussion, where the moderator tried to further expand the testers’ opinions through asking about their research habits and information seeking.

What has been said corresponds just to one measure of usability, or the tester’s perception of the websites’ usability, which should be contrasted with the record of what the participants had actually done. For this reason, we compared the data mentioned above with the answers to the tasks and the screen capture.

The tasks were designed to be open and to encourage the exploration of the websites’ content and features. They obviously varied from website to website, which can introduce a bias, but this was the only way to carry out a comparative analysis of such different resources. Tasks were explorative or comparative and always involved extracting information; only one task per edition was interpretative. For example, our testers were asked to explore the website to find content, or navigate through different versions of a text to find differences and correspondences. The interpretative task involved, for example, justifying the editorial decision, or reconstructing a lost passage.

We noticed that effectiveness was considerably influenced by low usability in specific cases. Task effectiveness was generally higher on *Walden* than in the other websites. The interpretative task had an unexpectedly low task completion for all the editions except for the *Walden* edition. The screen captures showed the reasons for the low task completion, when specific information retrieval or comparisons were involved. The *Patrick* edition and the *Dickinson Archive* challenged the testers in retrieving information and comparing them. Participants had to manually retrieve portions of text in transcription and facsimiles, and they could not access (or re-read) the key when it was needed to figure out the relationship between the witness and the tradition. The *St. Patrick* edition’s search function and the *Dickinson Archive*’s lexicon do not redirect to the exact passage but to the item, so that the screen captures are stuck on the transcription or facsimile, with the cursor constantly scanning the whole text in search of the result.

7 Discussion

In our study, we have concentrated on the philologist's perspective, choosing participants with a background in philology, and setting tasks typical for philologists' work, such as comparing versions. In this regard, it might not be surprising that the participants preferred the *Walden* edition to the other websites, precisely because it offered valuable support to the painstaking and time-consuming process of finding answers. The *Walden* edition allowed testers to solve problems arising from comparing different versions of texts quickly. From this point of view, our testers were more satisfied with the edition that fit their goal, minimised the effort in achieving it, and had significantly fewer bugs than the others. We believe that this is a general lesson learned from the study: in order to be relevant to the user, the interface of the DSE must support the work process *better* than the book does, or it will not be relevant.

In our focus group discussion, it became clear that the participants' habits and conception of research are still very much rooted in print. For them, viewing original sources is fundamental. Yet, almost all of them preferred the only edition without facsimiles. This is quite contradictory. A superficial answer is that the *Walden* edition was user-tested, as we learned from the editor Paul Schacht. This means that all the minor inconsistencies that characterise the design of any application were presumably already resolved for *Walden*.¹³ Another answer might concern the balance between website objectives and user needs, which is something that characterises the *Walden* edition in particular, compared with other competitors. In being essentially geared towards improving efficiency in comparison, the *Walden* design cuts away almost all the other functions to focus on one, a one-page interface, where navigation and the "feeling of getting lost" that characterised the research experience of our testers on *St. Patrick Confessio* and the *Dickinson Archive* is reduced to minimum.

It is worth emphasising that the three editions studied are already of relatively high quality and usefulness compared to many of the other DSEs that we looked at. Yet, two of them fell short of the paper edition, despite offering additional features and content. How is that possible? We assume that there is a threshold of quality, both in usability and content, below which a DSE is no longer more useful than a paper edition – and may, in fact, fall short of it altogether. If this is the case, it may well be that users not only get frustrated and return to paper editions, but they also "learn" that DSEs are not useful for them.

For example, even though the *Patrick* edition "includes high-quality facsimiles", they are hard to use, and the website does not support any user interaction crucial for context, reading, retrieval, etc. Interaction is a fundamental part of how the brain

¹³ For instance, the editors would have probably fixed the linking on hover from apparatus to text, instead of the more natural from text to apparatus, which most participants disliked so much in *St. Patrick's Confessio*.

comprehends, learns, and represents, and if certain kinds of digital resources do not improve interaction, digitization might not surpass the threshold of usefulness required by specialists interacting with their texts. In particular, we face the challenge of building a larger information environment than ever, where users are supposed to acquire entirely new cognitive maps (different from system to system) without being able to rely on the basic methodologies of reading (e.g., page turning, footnote identification, index usage and so forth) and writing. In general, the solution so far has been to provide metaphors, the most common of all is, of course, the printed book (what Sahle defines “the page paradigm”¹⁴). However, an interface that resembles a book and shows searchable facsimiles is what Google books already offers, good for lay users.

For scholarly resources to meet the needs of specialists, they should consider taking user interface development more seriously. As Dillon et al. expressed some decades ago, “if that [a book emulator] was all such a system offered it would be unlikely to succeed. It would just be a second-rate book.” The transposition of the book into a digital medium must be critically reconsidered, starting with the user experience. Taking user-goals, -needs, and -processes into account leads to better interfaces, and better interfaces are needed to attract more users. Improvements in usability are not expensive and do not require arcane knowledge. Talking to actual users instead of editors when designing the interface (even before starting wire-framing or regular sessions to test the interface design) is easy and can make a big difference in how many people will be willing to use the DSE, rather than alternatives.

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¹⁴ “One will have to state of traditional editors, even in case they will become aware of the fundamental methodological issues of concern to them, they hardly ever had a chance to think of their editions without constantly having a printed page layout before their eyes. They will always have been conscious of the only possible end point (the printed book) - maybe even more than of the starting point (the documents of the transmission).” (Sahle *Digitale Editionsformen* 270, translated in Pierazzo 9).

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8 Appendix – The tasks

Patrick

A good part of your Latin language and medieval culture course is centered on the figure of St. Patrick's and his production. Thanks to a variety of online searches, you learn about a digital edition that could help you deepen various aspects of the subject. Enter the site and evaluate. What does the site offer? What is the edition? List some materials that seem useful for writing a short essay on St. Patrick's figure.

So go open the editio princeps

Open the Confessio text in Latin to read the text.

Who is the publisher? Also indicate the year of publication.

What kind of apparatuses does it present?

Check the stemma to keep in mind the succession of witnesses.

At this point you want to check the witnesses.

Go to paragraph 19 of the Latin text of Confessio (canonical version), where you read "Conuertimini ex fide ex toto strings to Dominum Deum meum, which nihil est impossibile illi" and compare the transcription to witness C. Does it correspond?

Then you have to judge if code C is a major witness for text reconstruction, you have to check the year, bibliographic information, writing and other features (as specified below):

Where is "Bannaventa di Bernia"?

Open the canonical edition at the corresponding passage and justify the publisher's choice. The site offers images of manuscripts and print editions, then open the J. Ware edition and transcribe the name of the site as it is written there.

Reopen the canonical edition and check the apparatus. In the apparatus, you read the Greek *Phi* letter, which is an abbreviation. What does it represent?

Walden

You have been given the task of identifying some examples of critical apparatus alternative to Lachmann. One of these is adopted by geneticists, who study the writing process and the composition of the work. You get acquainted with a digital edition of an American philosopher, writer and poet named Henry Thoreau, mainly known for the autobiographical script Walden, where he investigates the relationship between man and nature.

Enter the site and evaluate. What does the site offer? What is the edition for?

What is a fluid edition?

Now try to list the content of the site.

Open Chapter 5. Solitude. Then open the G version and version E. Select “This is a delicious evening when the whole body is” in the Princeton edition and find out the differences between the versions. In version A, the text presents a variant: ‘seems to be’ which is coloured in gray. Why publishers use this color? Open the “pop up notes”. In which versions does the author change from “looks to be” to “is”?

Return to the ‘Table of Contents’ and open Chapter 15 “Winter Animals”. Select the sentence in version A: “with the most harsh and tremendous voice I heard of any inhabitant” and note the differences with the Princeton edition. Can you explain what happened in the composition process?

In what of the versions does this variation occur for the first time?

Dickinson

You have to write an essay about Emily Dickinson and manuscript culture. Dickinson’s print editions are all posthumous and interpolated by publishers since Dickinson did not spread any of her writings (at least on her own behalf) when she was alive. According to some, there are various reasons that would lead to the hypothesis that the poet believed his work was completely “finished” in manuscript form.

Enter the site and evaluate. What does the site offer? What is the edition for? Who is the publisher? Also indicate the year of publication.

What kind of apparatuses does it present?

Check the stemma to keep in mind the succession of witnesses.

Find the manuscript corresponding to “Her Sovereign People”. How many witnesses can you list?

Click the link to the manuscript, open the transcript, search for the year of the first publication in the box dedicated to the bibliographic information (specify below).

How many print editions are contained in this archive (specify the name)

Something curious about the first line, open the page containing the manuscript text of “Her Sovereign People” in full screen. Go back and check the transcript. Does it match perfectly?

Look for the meaning of the word “Sovereign”. Note that the “sovereign” form is the equivalent of the term “sovereign”. Look how many times the correct word “sovereign” is used throughout the corpus and indicate the number.

9 Appendix II – Results from the survey

	Patrick		Walden		Dickinson	
	agree	disagree	agree	disagree	agree	disagree
1. Everything on this website is easy to understand	4	9	7	6	3	10
2. This website looks professional	10	2	11	2	9	4
3. This website needs more introductory explanations	12	1	4	9	11	2
4. Remembering where I am on this website is difficult	5	8	1	12	5	8
5. I believe I could become productive quickly using the system	10	3	11	2	9	4
6. Using this website for the first time is easy	4	9	10	3	5	6
7. Overall, I am satisfied with the system	9	4	9	4	9	4
8. This website is a precious resource	12	0	13	0	12	1
9. This website helps me find what I am looking for	6	7	11	2	5	8
10. I can quickly find what I want on this website	5	8	9	4	5	8
11. I get what I expect when I click on things on this website	8	5	11	2	5	8
12. This website has much that is of interest to me	11	2	10	3	10	3
13. I trust this website	13	0	12	1	9	4
14. It is difficult to tell if this website has what I want	7	6	5	8	7	6

	Patrick		Walden		Dickinson	
	agree	disagree	agree	disagree	agree	disagree
15. I feel in control when I am using this website	5	8	9	4	2	11
16. This website seems logical to me	8	5	13	0	6	7
17. I can't find what I want on this website	8	5	4	9	6	7
18. The pages on this website are very attractive	9	4	10	3	9	4
19. I feel efficient when I am using this website	6	7	10	3	4	9
20. Learning to find my way around this website is a problem	7	6	2	11	6	7
21. This website has some annoying features	0	13	0	13	3	10

Design of a Digital Library Interface from User Perspective, and its Consequences for the Design of Digital Scholarly Editions: Findings of the *Fonte Gaia* Questionnaire

Elina Leblanc

Abstract

A clear separation is made between digital scholarly editions and digital libraries, as the few digital libraries that provide digital scholarly editions exemplify. This situation might be related to the perception we have of these two resources, but also to design problems (visualisation of the critical apparatus for example) that seems to prevent us to consider digital libraries as interfaces for digital scholarly editions. The *Fonte Gaia Bib* digital library – a French-Italian project – is aiming at embedding digital scholarly editions in its infrastructure to propose an overview of Italian studies at the digital era. For that, we have chosen a User-Centred Design (UCD) approach to co-create the interface of *Fonte Gaia Bib* with its users. The first phase of this process has been a questionnaire launched in May 2016 and focused on users, services, and collaboration. The 67 answers collected showed shared practices among the users (e.g. reading, search) and underline a wish to be implied in the life cycle of digital libraries, through the improvement of its collections (e.g. tagging, OCR correction). By comparing these findings to the ones focused on digital scholarly editions, it appears that digital libraries and digital scholarly editions share similar characteristics that allow us to envisage a common interface for both resources.

1 Introduction

Few digital libraries offer digital scholarly editions to their users, like *Les Bibliothèques virtuelles humanistes* (BVH) or the *Cambridge University Digital Library* (CUDL) attempt to do. Even if digital libraries provide digital contents which are varied in their form and their scope, it seems that a clear separation is made between digital libraries and digital scholarly editions.

This separation tends to reproduce the distinction made by Patrick Sahle between digitized editions, which are a digitization of one printed edition, and digital editions which are a “representation of a potentially large number of documents” (Sahle 27). This might also be related to the perception we have of digital libraries. They are

often perceived as extensions of physical libraries (of which they mimic the services and the form), or as data silos with little editorial content, exceptions made for bibliographical metadata (Claerr and Westeel 26–27). Digital libraries are thus perceived as a reproduction of objects, whereas digital scholarly editions are a representation of works, and express the point of view of an editor (Pierazzo 45). While digital libraries seem to be perceived as collections that may contain materials for potential scholarly editions or digitized print editions, scholarly editions appear to have a greater degree of scholarly enrichment.

However, this is a very restrictive understanding of digital libraries, which aim at going beyond this kind of vision. Indeed, we can define digital libraries as resources linked to cultural or research institutions, and relying on the long-term preservation and on the promotion of heritage content, by offering services and functionalities to their users (Claerr and Westeel 26). Through this definition, it appears that digital libraries and digital scholarly editions share common objectives. Each proposes a model of the written heritage to promote its understanding and its dissemination to a large number of people. They both feature interfaces that link users to digital resources through services. Finally, they all aim at enlarging their scope and at engaging their users more closely. In fact, issues around data enrichment and collaboration between users and cultural and research institutions and users are more and more compelling, as the works done by the *Devonshire Manuscript Project* or by the Australian digital library, *Trove*, exemplify. Reflections about the role of the users during the development process and users' interaction with the digital content are becoming crucial for the conception and longevity of digital resources.

However, even though some studies have been conducted (Bryan-Kinns and Blandford; Bouvier-Ajam; Kimani et al.; Bourgeaux; GMV; Blackwood), users of digital cultural resources are still an unknown public and a gap remains between the users as they are postulated by the researchers and the *real* users (Dobrevă et al. 2–4). Who really are these users? What do they want to do when they access a digital library or a digital scholarly edition? What is their degree of engagement with digital content? What is the relationship, if any, between user engagement and user interface?

These questions are at the heart of the *Fonte Gaia Bib*¹ project, a French-Italian digital library that attempts to offer digitized editions and born-digital ones in the same infrastructure, blurring the borders between digital libraries and digital scholarly editions. In order to develop a suitable user interface for the *Fonte Gaia Bib* portal and to better understand the practices and the needs of users, a questionnaire has been disseminated in May 2016. This paper aims at presenting the *Fonte Gaia* questionnaire findings, and at proposing a reflection on their implications for the design of digital libraries and digital scholarly editions alike.

¹ Fonte Gaia Bib (Beta version): <www.fontegaia.eu> [Accessed 24 Aug. 2017].

2 Background of the questionnaire: the *Fonte Gaia* project

As mentioned above, *Fonte Gaia* is a French-Italian project that was launched in 2009 at the Grenoble Alpes University. Its main objective is to gather French and Italian researchers in a network of exchanges and debates about Italian studies. It comprises a blog (*FG Blog*²) and a digital library (*FG Bib*). The latter aims at becoming a reference portal for the whole community of Italian studies, by gathering varied content (digitized and harvested books, digital exhibitions) and to include digital scholarly editions created by collaborators of the *Fonte Gaia* project. The native digital editions will not be separate projects, but will share the same identity, the same interface, and the same services as the digital library. *FG Bib* can be seen as the main collection and the digital editions as some of its sub-collections. From this point of view, *FG Bib* is not only a digital library, but also a hub that hosts projects and cultural initiatives, proposing an overview of Italian studies in the digital age.

As the library aggregates projects, it also aims at gathering users by building a mixed community, where specialist and lay users collaborate for the improvement and the enrichment of the digital content. For that, *FG Bib* is working on developing a set of interactive and participative services that engages users with the resource in innovative ways, i.e. via an interface that allows users to be both readers and authors of the content they access. In this context, it is essential to know the profile, the needs, and the expectations of the users in order to build a user interface that suits them and encourages them to collaborate.

The *Fonte Gaia* team has chosen a user-centred design (UCD) approach to develop its digital library. As defined by Donald Norman, Peter Morville or Jesse James Garrett, in this approach, resources or services are developed from the needs and expectations of users: products adapt to users, and not the contrary. UCD is an iterative process where users are engaged in each phase of the conception of a resource, from the analysis of users' needs to the development of prototypes and their evaluation, by applying both quantitative and qualitative methods (George 3–16; Daumal 5–7). The publication of a resource, and in our case the launch of the digital library, depends on the results of the evaluation phase, as shown in fig. 1. Indeed, if the evaluation of the first prototype (prototype a) is not conclusive, because of some troubles or a negative user feedback, the prototype has to be improved and re-evaluated, after a revision of the findings of the analysis phase. If consequently users approve the new prototype (prototype b), the latter will be launched online. Otherwise, a new iteration begins until a consensus is reached.

The analysis phase of our development process (fig. 1) is based on a comparison between an approach that leans on the users to build a design and development

² Fonte Gaia Blog: <fontegaia.hypotheses.org> [Accessed 24 Aug. 2017].

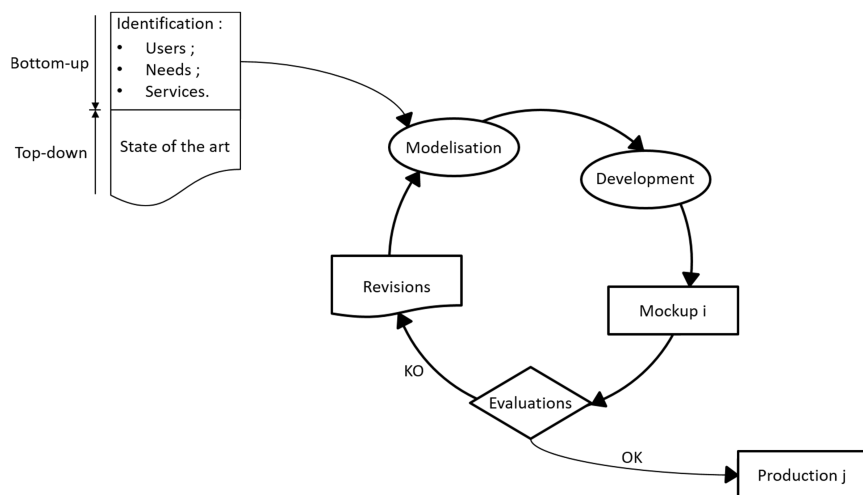


Figure 1: UCD approach of the *Fonte Gaia* project. Adapted from Tsakonas (56).

strategy (bottom-up), and one that sees creators of resources propose innovative services to their users (top-down). The objectives of the former strategy is to reveal, through user studies (e.g. questionnaires, interviews, focus groups), not only the needs of the users, but also their usual practices when they access a resource. The results of these user studies form the basis for the elaboration of the user interface and of the services of the digital library. Top-down approaches are based on the projections and experiences of creators, which then deliver the results of their research to their users (Salaün and Habert 37). The *Fonte Gaia* project has chosen to undertake and balance both approaches. By intersecting the results of the bottom-up and top-down strategies, we hope to find ideas that match the needs of the users, of the contents, and of the organization behind the project.

The first phase of the bottom-up approach took the form of a questionnaire that pursued the following objectives:

- Identification of the users of digital libraries, from a general point of view;
- Identification of the *Fonte Gaia* community, already gathered around the scientific blog of the project, i.e. *Fonte Gaia Blog*;
- Examination of the notion of service and evaluation of the degree of engagement of users with digital libraries.

Each goal had a profound influence on the way the questionnaire was conceived and disseminated (Leblanc).

3 Dissemination and results

The questionnaire has been disseminated online and translated into three languages: French, Italian, and English, in May 2016.³ The ways of distribution were different according to the target groups. The *Fonte Gaia* community was reached through the project's blog and its Twitter (91 followers) and Facebook (231 followers) accounts. We can assume that the followers of the two accounts have an interest for Italian studies and for our project, and are potentially future users of *Fonte Gaia Bib*. To increase the number of potential answers, the questionnaire was also disseminated through mailing lists, other blogs and the professional networks of the project's members.

We received 67 responses. Surprisingly, few members of the *Fonte Gaia* community (21), who are gathered around the blog and the Twitter and Facebook of the project, answered to this questionnaire. Such a limited number of responses might give us some evidence about the profile of the *Fontegaianautes*, but it is certainly not sufficient to make strong hypotheses. Therefore, we devote less space to this aspect in this article, which will rather focus on the general users of digital libraries.

4 Those who came: sketching the profile of users of digital libraries

Judging by the responses, the user group of digital libraries is quite homogeneous: women (67%), young people between 25-34 years of age (49%), with a high educational level (60% of Master's degree), mostly in literature (44%). However, when it comes to professional activity, the results are varied (fig. 2).

Two main groups stand out: the GLAM⁴ professionals and the academic users, which are split into researchers and PhD students. We can define this community as experts and used to dealing with written heritage. This registration of the volunteers in a well-defined professional background has a strong impact on the way digital libraries are used (Leblanc), as we are going to see it through the next sections.

5 Perception of the digital libraries

5.1 A Broad Perception of the Digital Libraries

Instead of giving the volunteers a single definition of the digital libraries, which could restrain their answers, the questionnaire asked them for the names of the digital libraries that they have accessed for the past six months. Their answers helped us in

³ The questionnaire and the blog post are available here: fontegaia.hypotheses.org/1673 [Accessed 10 Feb. 2017].

⁴ GLAM is the acronym for "Gallery Library Archives Museum".

Q. 34: What best describes your activity?

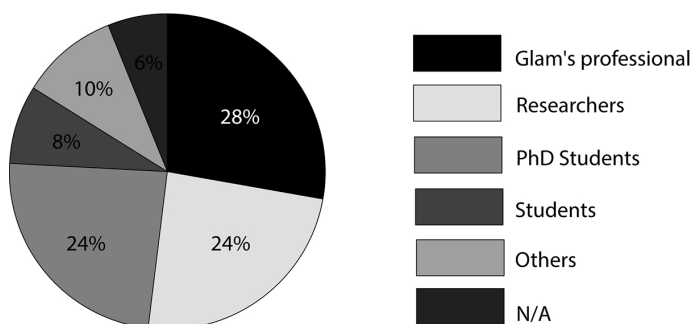


Figure 2: Activities of the volunteers.

outlining their perception of digital libraries. The results are varied and show that there is no consensus on what a digital library is:

- “Giant” and general purpose digital libraries: e.g. *Gallica*, *Europeana*, *Google Books*, *World Digital Library*
- Specialised digital libraries: e.g. *Bibliothèques virtuelles humanistes* (BVH), *Mazarinum*
- Scholarly digital projects: e.g. *Dante Online*, *Mandragore*
- Digital scientific journal platforms: e.g. *Cairn*, *Persée*, *JSTOR*, *OpenEdition*
- Ebooks platforms: e.g. *LexisNexis*
- Other resources: e.g. *YouTube*, *Wikisource*

The “giant” and generalist digital libraries are the most cited projects: all of the volunteers gave the name of one of these four digital libraries. These projects are “giant” because of their large amount of gathered resources, and they are general purpose collections because of the heterogeneity of the origin, period, and format of the sources. Thus they address the needs of a variety of users (Mion Mouton 22–23) and become reference digital libraries, which might explain why they are cited so often by the volunteers.

The other digital libraries mentioned include a more specialised selection of sources. They collect sources that belong together for institutional reasons (e.g. books that are held in the same physical library), sources from a particular time period and/or written heritage of a particular type (e.g. manuscripts, books).

However, the survey also shows that many volunteers do not differentiate between digital libraries and other digital resources they use. For instance, when asked for digital libraries, they cited other projects such as online journal platforms or databases

Q.4: In which context do you typically need to use a digital library? (Multiple choice)

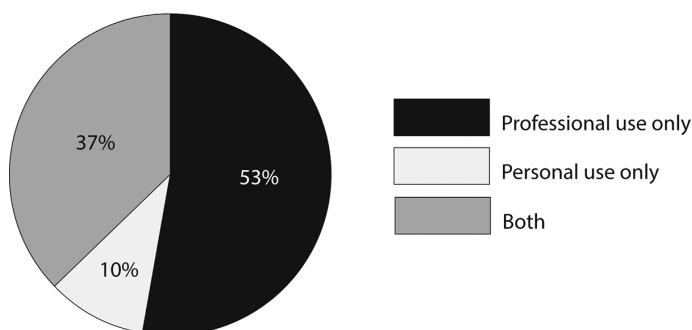


Figure 3: Context of use of digital libraries.

that cannot be called digital libraries according to our definition. The results underscore the ambiguity of the term “digital library” itself. Presumably, these other digital resources were cited because they look like digital libraries (in their appearance and based on the content they contain).

5.2 Digital libraries as work tools

Although the definition of a digital library changes from one user to another, one thing remains consistent: the “utilitarian vision” (GMV 25; Bonneau 51). This label, forged by *Gallica*, refers to a perception of digital libraries as tools, as resources that users access with a precise purpose for their work (e.g. research, teaching, prospection, technological surveys), and not as resources someone can access for leisure (GMV 25; Bonneau 51). The *Fonte Gaia* questionnaire might testify to this “utilitarian vision” as 53% of the volunteers claimed to access digital libraries for a “professional use only” (fig. 3).

One of the aims of the questionnaire was to identify a group of amateurs that only use digital libraries for their private research. The small number of people that declared to be using digital libraries for “personal use only” (10%) show that the *Fonte Gaia* questionnaire did not succeed in reaching this section of amateurs attested by similar initiatives, such as *Gallica* (GMV 13; Bonneau 21–22) or *Europeana* (Blackwood). This is likely the result of the way the questionnaire was disseminated. It can also be related to the fact that *Fonte Gaia* does not yet have a strong and well-established community of users like *Gallica* or *Europeana*. In both cases, it will be a challenge for *Fonte Gaia* to reach a better part of its potential users.

Q.1: In the past 6 months, how often times have you used a digital library?

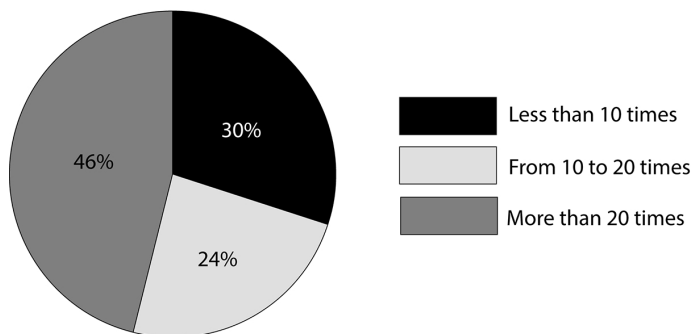


Figure 4: Frequency of use of digital libraries.

5.3 A high frequency of use

The first question the volunteers were asked was about their frequency of use of digital libraries (fig. 4). They claimed to be regular users of this type of resources: the majority accessed a digital library more than 20 times in the past six months. Even though there is a sizeable part of occasional users (i.e. less than 10 times in the same period), the predominance of frequent users underlines that here we have users that are familiar with these resources. We may assume that they develop some expertise in using digital libraries, which plays a role in the way they use them.

6 Practices of the users

This utilitarian and broader vision of digital libraries influences the choices users make when they use these resources. To illustrate this fact, we choose to focus on three different aspects: the main use of digital libraries, the search facilities and the reading habits.

6.1 Online reading vs Downloading

According to the questionnaire, the primary reason the volunteers access a digital library is to read documents online (fig. 5) rather than on their own computer after downloading them.

However, if we compare these results with the professional activity of the volunteers, we get a nuanced vision of the results of this question (fig. 6).

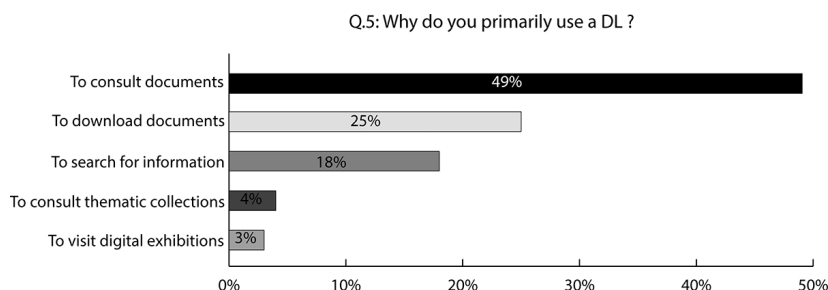


Figure 5: Main use of digital libraries.

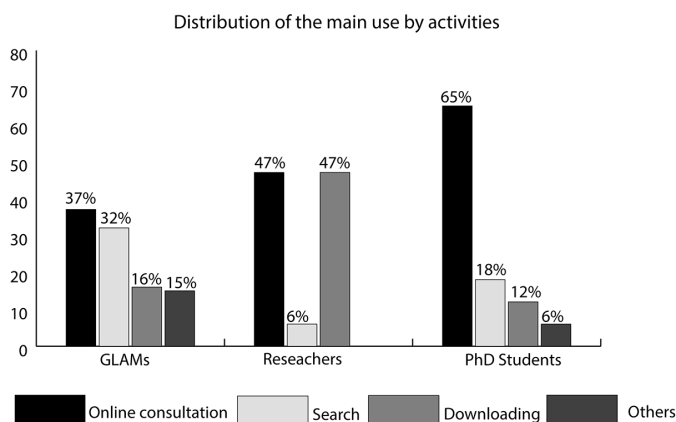


Figure 6: Different uses for different profiles.

This graph highlights different motivations for accessing a digital library. These motivations might be linked to the activity of the users. The GLAM professionals are the most varied with their answers: all possible choices offered by the questionnaire (fig. 5) are represented. This may testify to a versatile use of digital libraries. The researchers hesitate between an online consultation and a postponed “local” reading of the resources after downloading. On the contrary, the way PhD students use digital libraries is more homogeneous: the majority claims to access a digital library mainly to consult documents online.

The reasons for these differences regarding the motivation to access a digital library can, for now, only be imagined. For instance, it could be related to a difference of conception of digital libraries, a difference of user needs, a generational gap regarding digital uses, a difference of work experience, and others.

Q.6: The last time you made a search, what was your first action?

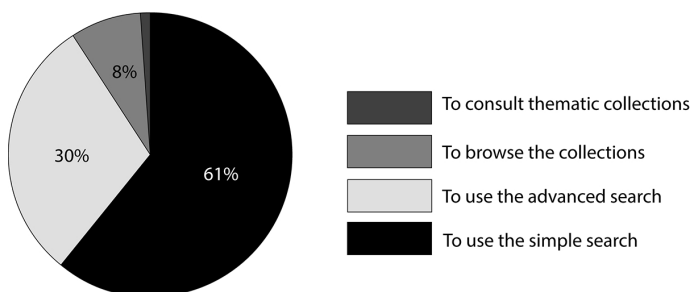


Figure 7: Use of the search functionalities.

6.2 The hegemony of the classic search functionalities

Question 6 focused on the main search functionalities used by the volunteers (fig. 7). The simple search obtains the highest score with 61% of the answers.

Presumably, the use of the simple search in digital libraries is, on the one hand, influenced by the Google search bar (Nicholas and Clark 90–93). The users reproduce in digital libraries what they are used to on the Web. On the other hand, we can explain the preference of the simple search by the fact that it might offer a high degree of freedom to the users in their research. With the simple search they are masters of their queries and the keywords they want to use (Dinet and Vivian 255). These results might reveal the preference of users for simple and easy-to-use functionalities, as compared with the advanced search (30%). The complexity of the advanced search forms, which assumed a high degree of knowledge about the contents provided, and the lesser flexibility it offers can explain this lack of interest from the users.

The case of browsing is interesting. This search method offers to users the possibility to browse all the collections and to filter them gradually according to their interests (author, languages, format, period, etc.). It allows seeing all the content and the way it has been organized by a digital library. Browsing is, then, considered a fast way to access information and to get unexpected results (McGann and Nowviskie 20; Varga 173). However, browsing only gets 8% of the choices. Two hypotheses can explain the fig. 7:

- A definition issue: the word *browsing*, used in the questionnaire, is a technical word that the volunteers may not know.
- A misunderstanding of the habits of the users: contrary to our notion, *browsing* is possibly not a preferred way of searching.

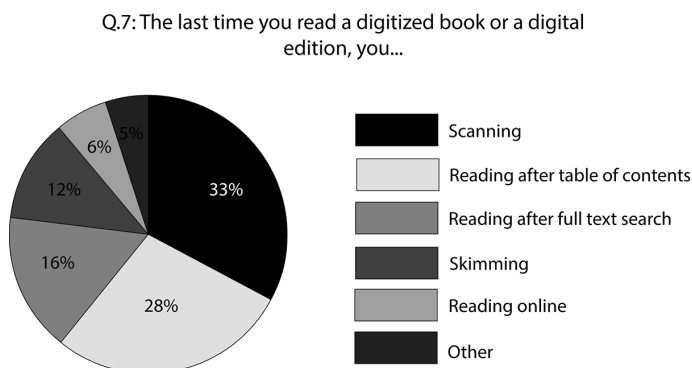


Figure 8: Reading practices of the volunteers.

6.3 A common way of reading the resources

Question 7 aims at identifying the main reading practices of users. The options offered to the volunteers were inspired by the typology of Annette Alder et al. in a 1998 study, and reused by Bryan-Kinns and Blandford in their 2000 study: reading the full text, skimming,⁵ scanning,⁶ reading the interesting parts after consulting the table of contents and reading after a full text search (fig. 8).

Considering these results, we can define the way users consult the digital resources as fast and targeted (Leblanc). Scanning got the highest score (33%), followed by reading after consulting the table of contents (28%) and after a full-text search (16%). These results suggest that users have a precise idea of what they look for and want to go directly to the information. These different types of “reading” may be influenced by several factors:

- Practices in the analog world: it is very common to consult the index or the table of contents of a paper book before reading it (Rehbein 63–64);
- Practices on the Web: influence of the search functionalities and the custom of getting the information quickly (McLoughlin 40).

The first part of the questionnaire focused on the practices of users. As we were elaborating our questionnaire, it appeared that these practices depend on several services. *Service* is a polysemous notion, but in the context of a library, we can characterize it as follows: “a service is everything that, in the existence and the

⁵ We speak of “skimming” when someone examines quickly at a text to have a general idea of its contents (Bryan-Kinns and Blandford 4).

⁶ We speak of “scanning” when someone examines quickly at a text to get a precise information (Bryan-Kinns and Blandford 4).

activity of a library, is a meeting between one of the elements of the organization and the public”⁷ (Calenge 22). In digital libraries, services act like “interfaces” between users, digital resources, and the organization behind the project itself. These entities are mutually dependent: each one influences the way the others behave (Gilbert 11–12). It is then essential to think about this notion of service that links the others together to build an interactive digital library.

After investigating the reading and searching activities of the users and the services related to them, the next section of this paper will focus on the interactive and participative services a digital library can offer, i.e. services where users are readers and authors of the content they access.

7 Toward an enriched and collaborative digital library

With the services proposed in the questionnaire, the goal was not only to know what people do, but also what they wish to do (Leblanc). To achieve this, closed and open questions were included in the questionnaire in order to create a right balance between the bottom-up and top-down approaches, i.e. between what people think they want to do and what we can offer them, based on the state of the art in the creation of digital libraries (fig. 1).

7.1 Top-down strategy: the closed questions

The first question concerns interactive services (fig. 9). The possible suggested services were inspired by the works of the Online Computer Library Center (OCLC) about social metadata in digital libraries (Smith-Yoshimura and Shein). Social metadata are metadata generated by users. They are characterized “as a way to both augment and recontextualize the content and metadata created by [G]LAMs” (Smith-Yoshimura and Shein 9). Social metadata helps the GLAMs to improve their collections and the research of other users (Smith-Yoshimura and Shein 9). Based on this definition, we may assume that social metadata services are one way to encourage interactions between the library and its users, who become collaborators in the development of the digital library.

It appears that four services have been chosen by almost the majority of the volunteers (fig. 9): adding tags and comments (48%), sharing bibliographic references (48%), creating personal collections (44%), and adding external content (44%). These results may have been influenced by the functionalities of Web 2.0 platforms (blogs and social networks). In fact, it is possible that the volunteers have selected these

⁷ Translated from French: “[...] est service tout ce qui, dans l’existence et l’activité de la bibliothèque, est rencontre entre un des éléments de l’organisation et le public”.

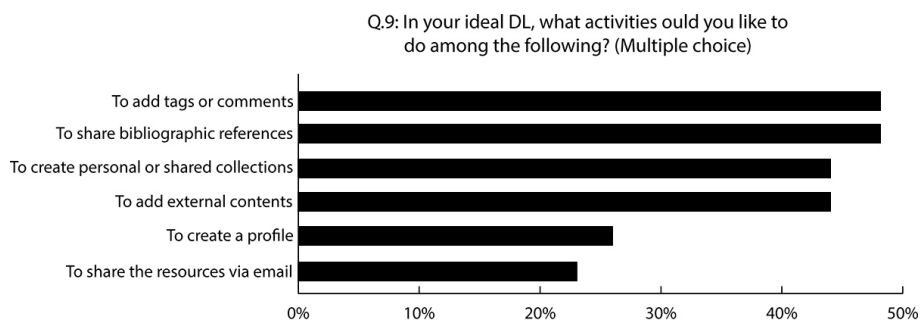


Figure 9: Hierarchy of services of improvement and interaction.

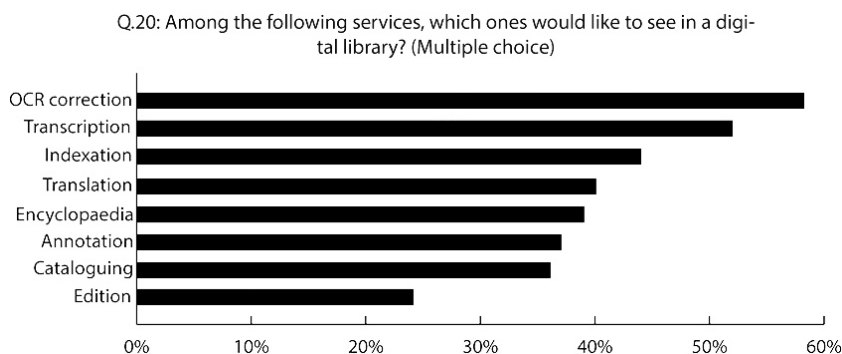


Figure 10: Hierarchy of collaborative services.

functionalities because they already know them, or because they expect to have the possibility to use them when they access a user interface (Leblanc). However, we may also suggest that there is a specific need of the users who want to cross the contents and share their knowledge with the library and perhaps also with others.

While question 9 focused on interactive services, question 20 focused on services of collaboration. As “collaborative” we defined services inspired by *crowdsourcing* initiatives where users collaborate to perform a certain task (Ridge 1–2) (fig. 10). We can identify two main collaborative services that the volunteers seemed keen on: correction of OCRed texts and transcription. The enthusiasm for these two activities can be explained by the wish to improve access to resources and to information. But, it is also possible that the volunteers have chosen these activities because they are perceived as not requiring technical or scholarly skills – even if it is not always the case for transcription (Leblanc).

Collaborative cataloguing and collaborative editing received the lowest percentage. This is surprising since we asked a group of potential experts of this task as, for instance, GLAM professionals and academic people. In the case of cataloguing, only 26% of GLAM professionals chose it, even though it is a common activity in their profession. We might explain these results by the high expertise required for the cataloguing of resources and the elaboration of editions, but we may also assume that these activities are maybe not yet seen as suitable for collaborative work.

7.2 Bottom-up strategy: the open question

Question 10 offered the volunteers the possibility to freely express the services that they want to see in a digital library. As opposed to the closed questions, the open one was optional. We obtained 13 answers, which we can divide in three categories:

1. Downloading and export services:

- “Partial or complete exports”⁸
- “Downloads of different formats and different resolutions”⁹
- “Access the underlying source format”
- “Download source files, compute images, APIs
- “To download plain text versions of primary materials”
- “Download as PDF”
- “Zotero compatibility and other metadata export”
- “To get a high quality full text OCR version”¹⁰

2. Search functionalities:

- “What I essentially seek in the collections of digital works is to be able to search by keywords [...]”¹¹
- “The indication of the shelf number of the document in the nearest “real” library”¹²
- “Internal search engine”¹³

⁸ Translated from French: “Des exports partiels ou généraux”

⁹ Translated from French: “Téléchargement de différents formats possible et différentes résolutions”

¹⁰ Translated from French: “Obtenir une version OCR full text de bonne qualité”.

¹¹ Translated from French: “L’essentiel de ce que je recherche dans le stockage d’ouvrages numérisés est de pouvoir y faire des recherches par mots-clés. [...]”.

¹² Translated from Italian: “L’indicazione della collocazione del documento nella biblioteca “reale” più vicina”.

¹³ Translated from Italian: “Motori di ricerca interni”.

3. Interactive services and social functionalities:

- “To have the choice of the model of recommendation (item based or social)”¹⁴
- “It might be interesting if each resource had a contact form to report problems to the admins, ask for additional information, report mistakes etc. Likewise, having an annotation tool [...] would be a plus”¹⁵
- “To share personal selections (thematic and enriched with commentaries, for example)”¹⁶

The results of the closed and open questions are somewhat complementary. We saw previously that users have an interest in interactive and collaborative services that lead to the improvement of the search of information. Similarly, when we look to the answers to the open question, we notice an interest for search facility and downloading services. In both cases, the notion of “search” seems to be central to the volunteers.

8 Conclusions and perspectives: digital libraries and digital scholarly editions

The *Fonte Gaia* questionnaire focuses on three main notions: users, practices, and services. Through these three entities, we obtained some evidence about what people do and what they wish to do when they access a digital library, and their engagement with and through the resources. These results can be interesting for digital scholarly editions as well, as both types of resources share common objectives and are very close regarding their content and their purposes in the mind of users.

Indeed, the *Fonte Gaia* questionnaire has shown that users do not make a clear distinction between digital libraries, digital journals, or digital scholarly editions. This fact has been noticed during surveys on digital scholarly editions as well. As reported by Dot Porter in a 2011 survey about how medievalist scholars use electronic texts, users do not make a clear distinction between digital scholarly editions and digitized editions, which are the main content provided by digital libraries (Porter). Successively, in a 2014 survey about digital scholarly editions and electronic devices, Aodhán Kelly noted that users do not think about the nature of digital resources: they just use them (Kelly 131).

¹⁴ Translated from French: “Avoir le choix du modèle de recommandation (item based ou social)”.

¹⁵ Translated from French: “Il serait intéressant que chaque ressource possède un formulaire de contact afin de pouvoir prévenir les gestionnaires de tout problème, information complémentaire, erreur etc. de manière simple et privilégiée. De même avoir des outils d’annotations [...] seraient [sic] un plus”.

¹⁶ Translated from French: “Proposer au partage un parcours personnel (thématique et enrichi de commentaires, par exemple)”.

Through the typology of the projects used by the volunteers, which has been presented at the beginning of this paper, it appears that the *Fonte Gaia* questionnaire confirms those results. As “texts on screen look remarkably alike, despite profound differences in quality” (Shillingsburg 87) and as they overlap in the mind of users, we can wonder if users use them in the same way.

8.1 General conclusions: users, practices and services

Humanities scholars as stakeholders of digital libraries and digital scholarly editions

The interpretation of the results of this questionnaire was influenced by the “expert” profile of the volunteers. They have a strong link with written heritage and a high level of expertise in their respective fields of research. In fact, academic and GLAMs communities are the ones that give birth to digital libraries. They probably have a better knowledge about the existence of this type of resources than other potential communities of users do and could be considered as the stakeholders of digital libraries (Leblanc). It is worthwhile to note that digital libraries and digital scholarly editions have similar stakeholders: they mainly target humanities scholars (Kelly 127; Pierazzo 162), even if today there are several endeavours that attempt to involve other communities of users, such as students or members of the larger public.¹⁷

However, we may wonder if the time of dissemination (before or after the launch of a digital library) and the scope of the questionnaire might have had an impact on the high number of these two communities among the volunteers. If we compare two questionnaires, such as the *Fonte Gaia*’s and the DELOS¹⁸ questionnaire (Kimani et al.), which are both generic and connected to any existing resource, we can see that not only the number of answers is similar,¹⁹ but also that the profiles of the volunteers are similar: a group of young people, with a high degree of education and expertise. If we compare the *Fonte Gaia* questionnaire and the 2014 *Europeana* questionnaire, which has been disseminated several years after the launch of the *Europeana* portal,²⁰

¹⁷ Amongst the projects that attempt to involve students, we can name the *Perseids* project, which is a collaborative editing platform that proposes to students and their professors to experiment the different steps toward a digital edition of ancient texts. Amongst the projects that attempt to involve members of the larger public, we can name the *Devonshire Manuscript* project or the *Infinite Ulysses* project that target humanities scholars and members of the larger public as well, by providing helping tools to understand the texts (comments, tables, introductions...) and offer the possibility to interact with them (comments).

¹⁸ This questionnaire was elaborated by the DELOS: Network of Excellence on Digital Libraries, a research project funded by the European Union (Kimani et al. 76).

¹⁹ The DELOS questionnaire received 45 answers.

²⁰ The *Europeana* questionnaire could be accessed through a link on the homepage of *Europeana*, so that

the results are different. The *Europeana* community is more varied (including e.g. public sectors, information services, retirees) than the one of *Fonte Gaia*. It includes members of the wide public (Blackwood), that general questionnaires such as *Fonte Gaia* or DELOS do not seem to be able to reach.

These comparisons underline the difficulties of “ante-digital library” questionnaires²¹ in identifying communities other than the academic world and the GLAM sectors. We may suggest that these other communities, part of the wider public, do not consider themselves as users of digital libraries, but as users of a specific digital library. We may also assume that the label “digital library” itself, used in the *Fonte Gaia* questionnaire, does not make sense to this section of potential users because it is a technical term mainly used in the Digital Humanities and the library context. Therefore, it is a challenge for digital library projects to identify the wider public and to develop a suitable platform for them.

Common practices: the case of reading

The comparison of users’ practices between digital libraries and digital scholarly editions is difficult due to the lack of user studies for the latter (Pierazzo 160). However, several works have been published about the way people read digital scholarly editions (Vandendorpe; Rehbein; Rasmussen). On this subject, Rasmussen identifies three roles. The first role is the *reader*, who focuses her attention on the understanding of a work, whether it is for leisure or for professional purposes. The second role is interested in the intertextuality and becomes a *user* as she pays more attention to the text structure and to the tools that allow her to analyse it. Finally, the third role would be the *co-worker*, who is characterized by her involvement at some point in the editing process (Rasmussen 126–128).

These roles can be applied to users of digital libraries: *readers* are only interested in the content and spend little time in the digital library; *users* are more involved and seek for tools to analyse the content; *contributors* participate in the improvement of the data and the enrichment of the digital library. With digital scholarly editions, the focus of each role is on the links between texts and works (Rasmussen 126–128). For digital libraries, it is on the relation between content, services, and interface. The *Fonte Gaia* questionnaire helps us to refine the nature of these roles by giving us the point of view of users on what they think they do when they use digitized or digital editions, and what they want to do with them.

The practices of users as they appeared in the questionnaire might be of interest for the definition of the *user role*. The volunteers claim to do scanning or to use

any users can answer easily.

²¹ By this, we refer to questionnaires that have been disseminated before the launch of a specific digital library.

the index or full-text search. Previously in this paper, we interpreted these results as targeted and fast reading. In light of the reading studies, we can go beyond by saying that readers search more than they read and that they “hunt” for information (Vandendorpe 205; Rasmussen 127). To improve this way to “read” texts and to assist users, we can imagine for both digitized and digital editions to provide access to dictionaries or offer a semantic full-text search²² that can help users to not only search by word-forms, but also by their meaning.

We can note that these results are similar to the findings of the DELOS questionnaire in 2009, but also to the ones obtained by older studies on digital libraries (Furnas and Rauch; Bishop; Bryan-Kinns and Blandford). This coincidence may testify to a permanence of the practices of the users, independently of the type or of the content of digital libraries themselves.

We can also notice a certain continuity in practices between digital libraries and the rest of the Web. In fact, users might reproduce practices that they have developed in other contexts, such as simple search or scanning for example. Users may not perceive digital libraries as being different from other digital resources on the WWW, such as digital scholarly editions. Thus, digital libraries do not imply specific uses, but are used as any other digital resources.

Interactive and collaborative services: the users’ point of view

As far as the services are concerned, we have identified the willingness of the volunteers to be involved in the lifecycle of digital content. Their offer of engagement takes different forms (Leblanc):

- Improvement of the quality of documents (indexing, OCR correction)
- Improvement of the description of resources (comments, addition of external content and of bibliographical references)
- Involvement in the editing process (transcription)
- Reorganisation of the collections of the digital library (sharing of personal collections)

These findings give us some clues about the way users want to be involved with cultural resources or, in other words, how they want to be “co-workers”. Digital libraries and digital scholarly editions may both benefit from these services proposed by the volunteers: such services would improve the quality of the data, and would contribute to the development of an active and dynamic community of users (Smith-Yoshimura and Shein 9, 11–12). For digital libraries more specifically, these findings

²² We mean by “semantic full-text search” an enriched full text search that offers to users the possibility to search a word and its synonyms. For example, if a user is interested by the word “vessel” in a text, the interface will suggest him to search “boat” or “steamer” as well. In this way, the full-text search can enlarge the perspectives of users and help them to have better searches.

seem to suggest that users want to be engaged with the digital contents and the digital library itself, through a strong collaboration with the librarians and the researchers behind the resource.

A wish for collaboration between users and librarians appears through the choice of interactive and collaborative services, where each part brings its own knowledge and benefits from the knowledge of the others. However, the willingness to collaborate with other users is not clearly stated. Indeed, selecting collaborative OCR correction or collaborative transcription does not mean that users want to collaborate with each other. Projects that have already experimented with collaborative efforts (such as *Trove* or *Transcribe Bentham*) noticed that each user only works on one document and there are few cases where several users work on the same resource (Causser and Wallace, paras 71–72). We may, then, speak of cooperation rather than collaboration, because each user works on his side without sharing knowledge or skills with others. However, digital libraries might benefit from the creation of communities where each member collaborates on the same resources: it may strengthen their image of working space for a specific field of research where knowledge and ideas spring from exchanges and sharing between different types of users (Hord 5–7; Misanchuk and Anderson 7–8; Choi and Pak 359–360; Kozar 16–17)²³. However, how to achieve this is not yet clear.

8.2 Design implications: digital libraries as interfaces for digital scholarly editions? The case of *Fonte Gaia Bib*

The findings of the *Fonte Gaia* questionnaire highlight some relationships between digital libraries and digital scholarly editions that can lead to the integration of digital scholarly editions into digital libraries. This is what *Fonte Gaia Bib* is attempting to do. However, building an interface for both digitized content and digital scholarly editions comes with several challenges. The first one concerns the editing process: is a digital library a place for editing? We currently develop our digital library with the Content Management System (CMS) Omeka.²⁴ Among all the plugins offered by this CMS, there is only one relevant to digital scholarly editions: the TEI display plugin.²⁵ We can note that this plugin only concerns the editions' display, and not the editing. The set of Omeka plugins currently available draws an image of what a digital library

²³ I am also grateful to Emmanuelle Morlock and Adeline Levivier from the HiSOMA laboratory (Lyon, France) for our exchanges about this subject.

²⁴ Omeka. <omeka.org> [Accessed 2017-09-01]. Omeka is a content management system maintained by the Roy Rosenzweig Center for History and New Media (George Mason University, Virginia). It is mostly used by GLAM institutions, because it answers to their needs to manage large and varied collections, to display those collections in innovative and pedagogical ways (viewers, digital exhibitions) and to preserve them through hierarchical classifications and standard metadata (Dublin Core).

²⁵ TEI Display plugin: <omeka.org/codex/Plugins/TeiDisplay> [Accessed 2017-08-29].

(or a cultural website in general) is and what it can do. The absence of an editing plugin suggests that it is not down to digital libraries to offer such service. Besides, when we analyse the digital libraries that provide digital scholarly editions (BVH, CUDL), we notice that they only focus on display problematics: the editing process is done elsewhere behind closed doors. This paints a picture of digital libraries as resources for exhibitions and not for the creation of new knowledge. It seems that embedding an editing service could possibly question the nature and the role of digital libraries.

The display of digital editions is also challenging for digital libraries because it seems difficult to provide a tool that manages both digital and digitized editions. Indeed, digital editions have very specific components (critical apparatus, display of several witnesses) and require advanced tools (glossaries, concordances, image manipulation, etc.) which are not required by digitized editions (Rosselli Del Turco, paras 25–29; Pierazzo 176). Besides, digital editions are the product of many disciplines which can have their own editing traditions and use different models (Pierazzo 176). Therefore, if a common user interface will not disturb users in their navigation (Rosselli Del Turco, para 7), it will blur these differences that make the wealth of scholarly digital editions (Pierazzo 176).

The solution chosen by *Fonte Gaia* is to dissociate the interface of the digitized editions (the digital libraries) and the scholarly digital editions, which are both aggregated inside the digital library and satellite projects that gravitate around it. Digital editions are related to digitized content of the digital library but a clear distinction will be made with the digitized content. They will share common services (enriched and active reading, participative services), but will also have specific ones that reflect their own characteristics (such as facsimile-digital edition alignment, viewer of several witnesses, etc.). In this way, *Fonte Gaia Bib* appears as a hub that both gives a common identity to its contents and respects their own specificities.

The findings of the questionnaire reveal priorities and expectations of the volunteers. These findings are interesting for the design of digital libraries and digital scholarly editions as well. It is then important that these findings are considered in the development of *Fonte Gaia Bib*. However, the services that the volunteers have neglected are also important. We have to understand why these services received less interest: is it because users do not need them? Or is it because the way these services are currently developed does not correspond to the user's needs? All these questions lead to the next phases of the *Fonte Gaia* user studies in which the objective is to explore the results of the *Fonte Gaia Bib* questionnaire through a series of interviews, focus group and usability tests. The goal is to collect data which will help us build an interface that suits its users.

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9 Appendix: The *Fonte Gaia* questionnaire

Launched in 2009 by the Pierre Mendès France, the Stendhal University and the CADIST Language, Literature and Italian Civilisation of the University library of Grenoble, *Fonte Gaia* is a multi-partnership project about digital humanities and Italian Studies. It is composed of a blog, *Fonte Gaia Blog*, and of a digital library, *Fonte Gaia Bib*, that will gather digitized books and enriched digital scholarly editions.

This digital library is currently under development and in this context, the team is working on studying the users of digital libraries, in order to identify their profile and their needs, and then to improve the interface and the services provided by the digital library.

This survey is also part of a PhD thesis pertaining to the users of digital libraries and their interfaces. The results, which will remain anonymous, will be the subject of several publications.

You and the digital libraries

Q.1: In the past 6 months, how often times have you used a digital library?

- Less than 5 times
- 5-10 times
- 10-20 times
- More than 20 times
- I can't recall

Q.2: Which digital libraries did you use?

Q.3: What type of resources do you primarily consult? (Multiple choice)

- Digitized books
- Digital scholarly editions
- Genetic editions
- Iconographic documents (reproduction of pictures, photography, engraving...)
- Videos
- Audios

Q.4: In which context do you typically need to use a digital library? (Multiple choice)

- Research or teaching activities
- Personal research
- To fulfil my need for curiosity and/or knowledge
- Other:

Q.5: Why do you primarily use a digital library?

- To consult documents (books, pictures...)
- To download documents
- To search for information
- To consult thematic collections
- To visit virtual exhibitions
- Other:

Q.6: The last time you made a search, what was your first action?

- To use the simple search
- To use the advanced search function
- To browse the collections
- To consult the thematic collections
- Other:

Q.7: The last time you read a digitized book or a digital edition, you...

- Read the full text online
- Skimmed the text
- Scanned the text to search precise information
- Only read the parts that interested you after consulting the table of contents
- Only read the parts that interested you after a full-text search
- Other:

Q.8: When you download a document, what format do you prefer?

- Low resolution images (.jpeg)
- High resolution images (.tiff)
- PDF (.pdf)
- E-Books (.epub)
- You never download documents

Q.9: In your ideal digital library, what activities would you like to be able to do among the following? (Multiple choice)

- To add tags or comments to the resources
- To add external contents to the resources (bibliographic references, hypertext links...)
- To share bibliographic references about a resource or a topic
- To create a profile (with a mailbox, a consultation history, bookmarks...)
- To create personal or shared collections using the resources of the library
- To share the resources via email or via the social networks

Q.10: Would you like to see other services that are not in the previous list?

Q.11: Would you like to be able to work on the resources, hosted by the digital library, in a personal workspace with advanced tools (confrontation of resources, production of digital editions...)?

- Yes
- No

Q.12: What device do you mainly use when you visit a digital library?

- Computer
- Laptop
- Digital tablet
- Smartphone

About The Fonte Gaia digital library

Q.13: Prior to participating in this survey, did you know of the Fonte Gaia digital library?

(If Yes, go to the Q.14; if No, go to the Q.17).

- Yes
- No

Q.14: If yes, how did you learn about it?

- Blogs
- Institutional websites (libraries, universities...)
- Social Network (Facebook, Twitter)
- Mailing list
- Through a search engine
- Through a friend, a teacher, a colleague...
- Other:

Q.15: Do you intend to make use of *FGBib*?

- Yes
- No

Q.16: If yes, why do you wish to use *FGBib*?

- For your research or teaching activities
- For your personal searches
- Out of curiosity about the project and its contents
- Other:

Let's speak about collaboration

Q.17: Have you already taken part in a *crowdsourcing* project (collaborative transcription, OCR corrections, tagging...) in Social Sciences or Humanities? (*If Yes, go to the Q.18; if No, go to the Q.19*).

- Yes
- No

Q.18: If yes, in which of the following projects have you already taken part? (Multiple choice)

- *Transcribe Bentham* (University College of London)
- *What's on the Menu ?* (New York Public Library)
- *Old Weather* (National Maritime Museum)
- *Trove – Australian Historic Newspaper* (National Library of Australia)
- *Correct* (Gallica – BnF)
- *Wāisda ?* (Netherland Institute for Sound and Vision and Amsterdam University)
- *Ancient Lives* (University of Oxford)
- *Papers of the War Department* (RRCHNM, George Mason University)
- *DIY History* (University of Iowa)
- Others:

Q.19: If not, why?

Q.20: Among the following collaborative services, which ones would like to see in a digital library? (Multiple choice is possible)

- Collaborative transcription
- OCR correction
- Collaborative translation
- Collaborative indexation (tagging)
- Collaborative annotation
- Collaborative edition
- Collaborative cataloguing
- Collaborative encyclopaedia
- Other:

Fonte Gaia Blog

Q.21: Do you know the *Fonte Gaia Blog*? (If Yes, go to the Q.22; if No, go to the Q.25)

- Yes
- No

Q.22: If yes, how do you learn of it?

- Other websites
- Social networks
- Through a search engine (like Google)
- Thanks to a friend, a colleague...
- Other:

Q.23: How often do you visit the blog?

- Daily
- On a regular basis (at least once per week)
- When a post interests me

Q.24: What topics are you interested in?

A little bit about you

Q.25: Are you...

- A man
- A woman
- Prefer not saying it

Q.26: Your age

- 15 to 18 years old
- 19 to 24 years old
- 25 to 34 years old
- 35 to 44 years old
- 45 to 54 years old
- 55 to 64 years old
- More than 65 years old
- Prefer not saying it

Q.27: What is your country of birth?

Q.28: Your country of residence is it the same as your birth country?

- Yes
- No
- Prefer not saying it

Q.29: If not, where do currently reside?

Q.30: Do you speak several languages?

- Yes
- No
- Prefer not saying it

Q.31: If you do, which ones?

Q.32: What is your awarded qualification?

- None
- A-levels
- BA/Sc Degree
- MA/Sc Degree
- PhD
- Other:
- Prefer not saying it

Q.33: What was your field(s) of study?

Q.34: What best describes your activity?

- Information Technology
- Librarian, archivist, museum worker
- Book trade
- Primary or secondary education
- Higher education
- Unemployed
- Other:
- Prefer not saying it

Q.35: If you are working the primary, secondary or higher education sector, what is your position?

- Teacher
- Professor
- Researcher
- Student
- PhD student
- Other:
- Prefer not saying it

Thank you for your participation to the Fonte Gaia survey!

The Fonte Gaia project wants to establish a representative group of users to evaluate and improve the beta version of its digital library, through interviews, focus group and usability tests. If you are willing to take part in this experience, please contact us.

Appendix

Biographical Notes

Tara L. Andrews is University Professor of Digital Humanities at the University of Vienna. She currently leads a team working on an edition of the Armenian chronicle of Matthew of Edessa.

Elli Bleeker completed her PhD at the Centre of Manuscript Genetics at the University of Antwerp. She now works at the Research and Development Department of the Huygens Institute for the History of the Netherlands. Her PhD research, titled “Mapping Invention in Writing” and supervised by Dirk Van Hulle, focused on the textual genesis of literary works and how this can be studied within the infrastructure of a digital scholarly edition. She was an Early Stage Research fellow within the “Digital Scholarly Editions Initial Training Network” (DiXiT) funded by the Marie Skłodowska-Curie Action, and is currently an affiliate researcher at the University of Antwerp.

Roman Bleier studied History and Religious Studies at the University of Graz. Following his studies in Graz, he worked on the *Saint Patrick’s Confessio HyperText Stack*, a project of the Royal Irish Academy in Dublin, and completed a Ph.D. in Digital Arts and Humanities at Trinity College Dublin. After finishing his Ph.D. in 2015, he was CENDARI Visiting Research Fellow at King’s College London and worked at An Foras Feasa, the Digital Humanities Centre at Maynooth University. In 2016 he returned to Graz as DiXiT Fellow and has since worked as postdoctoral researcher on different digital scholarly editing projects at the Centre for Information-Modelling.

Martina Bürgermeister studied History and Digital Humanities. Since 2013, she has been working at the Centre for Information Modelling - Austrian Centre for Digital Humanities at the University of Graz. In 2014, she started co-developing the platform *monasterium.net* within the project *Illuminierte Urkunden als Gesamtkunstwerk*.

Federico Caria is a Marie Skłodowska-Curie ITN Fellow at DigiLab, La Sapienza, where he works for DiXiT – Digital Scholarly Editions Initial Training network, a 3-year project funded by the Marie Skłodowska-Curie Action Program. He is also studying for a PhD at the University of Cologne.

Hugh Cayless is a Digital Humanities research developer working for the Duke Collaboratory for Classics Computing. He has a long history with the Text Encoding Initiative, and is serving in his third term on the TEI Technical Council, having been its Chair for 2015–2017. His main research interests revolve around

digital editions and their larger linked data context. Hugh holds a Ph.D. in Classics and a Master's degree in Information Science.

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