Digital Scholarly Editions as Interfaces

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Interfaces in Digital Scholarly Editions of Letters

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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 editons 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.

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[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. Bootstrap[3] or Foundation[4]. 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.

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[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

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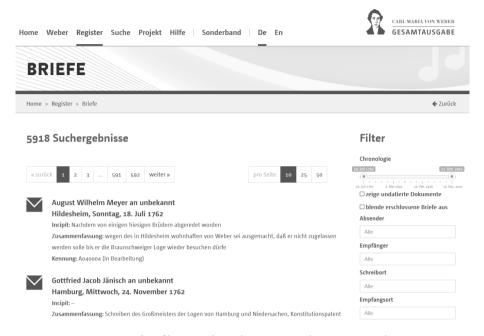
Figure 1: Index of letters in the Carl-Maria-von-Weber-Gesamtausgabe.

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.

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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)

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[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.

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 Fetzer proposed the idea of a "Mixed Scholarly Edition" (Fetzer, *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 retrodigitzed 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.

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[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_on-line/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 *prosoprogrAPhi*, 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

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[12] Available under: correspsearch.net.

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 –

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[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

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[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:fteditionhumbold&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

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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>.

```
<span class="Z3988"
title="url_ver=Z39.88-2004&ctx_ver=Z39.88-2004&rfr_id=info%3Asid%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

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[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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