# Digital Edition

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**Abstract** The article first explains the characteristics of digital editions and then discusses the requirements that must be met by a digital edition ("FAIR principles", structural requirements). In a further section, the potential of a digital edition compared to the traditional print edition is presented (interoperability, different usage scenarios, further development, transparency). Finally, the current limitations for both the productive and the receptive use of digital editions are addressed: lack of expertise, lack of tools, necessary interdisciplinary cooperation, pending standardization and recognition of digital editions as scientific achievements.*

**Keywords** Digital Edition, Presentation, FAIR Principles, TEI, Publishing

## 1. What is a Digital Edition?

Like its analog, printed counterpart, the digital scholarly edition provides basic access to sources for various areas of theology,[1] particularly areas doing historical research.[2] Digital editions make historical texts accessible and present them using rules initially defined or, in most cases, standardized long ago and then applied.[3] Depending on the subject of the edition and the editorial practice prevalent in the respective partial/specialist discipline (critical, diplomatic/documentary, genetic), an idealistic or materialistic concept of the text is taken as a basis.[4] The digital edition is then produced so

* This chapter, including quotations in foreign languages, was translated from German by Brandon Watson.

1 For a foundational volume on Digital Editions, see Apollon et al. (2014); Pierazzo (2015); Driscoll & Pierazzo, (2016); Boot, et al. (2016) and Bleier et al. (2018).

2 The focus is primarily on subjects that deal with the Old Testament, the New Testament, and the history of Christianity. The spectrum of sources and the languages, materials, and contexts that transmit these sources is correspondingly broad and requires adapted methods in each case.

3 The following remarks focus on textual sources; however, most of what is said below also applies to oral or musical sources.

4 Between the two extremes of an idealistic (edition of works) or materialistic concept of text (edition of individual manuscripts, inscriptions, or historical prints) there are, of course, many nuances that can make digital editions visible in comparison to printed editions. From an ancient studies perspective, see, e.g., Meins (2016).

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that the edition chooses an editorial method and form of presentation appropriate to its subject and tradition (cf. Sahle 2014).

The printed edition presents the edited text as the result of editorial, selective, and/or normalizing work, usually mediated by a publisher and potentially as part of a chronologically and/or thematically oriented series. In addition to the presentation of the edited text, an edition also documents (comprehensively) both the transmission findings or the transmission carriers and the editorial decisions, since only in doing so can the quality and reliability of the edition be assessed by the recipient; otherwise, users would have to refer to the sources on which the edition is based. Moreover, the digital edition is made accessible by means of various indices to enable selective access to the edited text based on questions of content in addition to the generally linear reading. However, materials such as transcriptions or collations (in tables or other forms), which were created in the course of the editorial work, are not made accessible to the recipients, or at best in a highly selective manner.

If the printed edition can therefore be described primarily in terms of its form of presentation, the digital edition, on the other hand, is fundamentally characterized by the fact that there is a strict separation between the data stored digitally in a specific file format (transcriptions, collations, edition, etc.)[5] and its digital (as a website, e-book) or analog (as a book) form. For a human user, however, this strict separation is often not recognizable at first glance, because one usually encounters the digital edition first or even exclusively at the level of presentation.

There is a characteristic separation of content (data) and form (presentation) unfamiliar within the book paradigm, where the two are inseparably fused.[6] The data of a digital edition can manifest itself in different forms of presentation and display, which corresponds to very different needs and research questions and covers only partial aspects of the data. By detaching the data from its *(one)* presentation,[7] a digital edition is thus open to very different perspectives, whereby the editor will normally present one's perspective(s) together with the publication of the data. The edition *can* then be received in the way presented but *must* not be, given the recipient has the

5 The de facto standard is the *Extensible Markup Language* (XML): https://www.w3.org/XML (Accessed: 18 June 2024) in the standardizing of the *Text Encoding Initiative* (TEI): https://tei-c.org/release/doc/tei-p5-doc/en/html/index.html (Accessed: 18 June 2024). However, theoretically (and in certain cases, practically) there are other conceivable formats, such as, SQL or graph databases. Ideally, the data as the "single source of truth" is the basis of all forms of presentation of a digital edition.

6 A comparable case would be the creation of an *editio minor* alongside an *editio maior* or that of a popular/reading edition alongside the scholarly edition. In the case of the digital edition, however, this fusing is created programmatically from the data of one edition (see previous note), whereas in a book, at least in the pre-digital age, two different print templates were created.

7 In principle, a TEI XML file is also a form of presentation, albeit a very particular one for non-technical users.

option of evaluating the data of the edition in a different way and under different premises, annotating and/or presenting the data further.[8]

The separation of data and its presentation has a further consequence. A printed edition is designed to be received by a human reader, whereas a digital edition, in its data form, is suitable for reception (and further processing) by a computer or computer programs (i.e., machine-readable), whether via an *application programming interface* (API) or a download. However, in the best-case scenario, the edition can (and should) also remain human-readable beyond the presentation (i.e., *the graphical user interface*, GUI) in the sense that a TEI-XML file itself is already a form of presentation.

The data is therefore the most important aspect of a digital edition. The data model behind the edition and the format in which it is stored therefore are critical. Standardization is already advanced. XML, which follows the guidelines of the *Text Encoding Initiative* (TEI), has *de facto* established itself as the data format, despite individual peculiarities of the XML format and the fact that TEI is basically not *one* language, but rather appears in a multitude of "dialects" not readily understandable to each other, have received criticism.[9]

What exactly is a digital edition: the data *or* the presentation of the data or the data *and* its presentation?[10] In the theoretical discussion, this question is usually treated on the level of "data" vs. "data and presentation," yet in practice the question is often answered in terms of presentation, insofar as the data is not made available to the recipient at all. How one answers this question also depends on whether, with Patrick Sahle, one understands the essential characteristic of a digital edition in the fact that a digital edition is digital in theory, method, and practice,[11] and therefore cannot be transferred to print without a loss of information or functionality,[12] because doing so would manifest itself in the presentation layer, which is expressed in the structures and peculiarities of the internet (keyword: linking). However, one must then necessarily discuss how the loss of information and functionality should be quantified

8 Doing so requires editors to "let go" and "tolerate" other interpretations and presentations in a way unfamiliar from the print paradigm, and users to be able to process the data themselves. See also below (Section 4.1.).

9 Criticism is mainly directed at the tree structure of XML and the resulting difficulties in modeling overlaps (https://www.tei-c.org/release/doc/tei-p5-doc/en/html/NH.html). Cf. Cummings (2018). Proposed alternatives are database-based, such as using graph databases, esp. A. Kuczera, e.g. Neill & Kuczera (2019), or SQL databases, see Cadmus: https://myrmex.github.io/overview/cadmus (Accessed: 18 June 2024) by Daniele Fusi. A more recent approach is the combination of TEI semantics and graph databases, as proposed by Kuczera (2022).

10 On this distinction, see Barabucci et al. (2017). The answer to the question is usually connected with a further aspect of digital editions, namely, long-term archiving; more on this idea later.

11 Cf. Sahle (2016, 28): "Scholarly digital editions are scholarly editions that are guided by a digital paradigm in their theory, method and practice."

12 Cf. ibid., 27: "A digital edition cannot be given in print without significant loss of content and functionality." In the article, Sahle draws on the extensive explanations in his dissertation (Sahle 2013a; b; c). This definition is highly influenctial in the current discussions.

and where the boundaries are. Another related aspect is the long-term availability or long-term archiving: particularly when an edition is "digital," according to Sahle's definition, which arises primarily at the level of presentation and less so at the level of data. If the presentation on the internet is up to date in terms of technical possibilities, then in view of the speed of development, a presentation must be updated to the current programming status after a few years at the latest, i. e., the programming must be developed further (but can also be equipped with new functions that were not previously feasible in view of new possibilities). The internet is constantly changing and evolving, and presentations must inevitably follow suit and be maintained permanently with greater effort than a book. The situation is different with the data of an edition, as the standards used develop slower and ultimately more generically,[13] so that the data can be updated with comparatively less effort for new versions. For this reason, too, the data should be seen as the core of a digital edition, on which all possible presentations are based.

In his development of a definition, Sahle introduces a further significant differentiation,[14] esp. in current practice, and must therefore be mentioned: the distinction between digital and digitized editions.[15] The digitized edition is mainly found where old print editions are retro-digitized, but sometimes also in new editions, when one simply transfers the print edition into the digital medium, i. e., to give it a digital form,[16] without exploiting the additional possibilities associated with digitality (see below in chap. 3). According to Sahle, the digitized edition is defective (and not to be desired); however, the digitized edition nevertheless remains important in the context of retro-digitization, because it allows the printed body of knowledge (and editions) to be transferred into the digital age and thus made usable and researchable using computerized methods. One need not expect that new, digital editions of all texts that are important for research in the respective subject area will be produced in the foreseeable future, or at all. In this sense, the digitization of printed editions represents a break comparable to the transfer of texts from manuscript to print and

13 TEI P5 was published in the first version in 2007, see https://doi.org/10.5281/zenodo.3556213 (Accessed: 18 June 2024).

14 See Sahle 2016, 27: "A digitized edition is not a digital edition." Cf. ibid., 33.

15 "Digitized" does not mean a book is scanned and then made available as a PDF or graphic file; rather, it means that the information is made available as a full text that can be processed further by a computer. In principle, the diverse full-text databases, such as the *Thesaurus Linguae Graecae*, https://stephanus.tlg.uci.edu (Accessed: 18 June 2024), offer digitized editions, yet without the scholarly apparatus fundamental to an edition.

16 The guidelines of the *Library of Digital Latin Texts*, see https://github.com/DigitalLatin/guidelines (Accessed: 18 June 2024), has some traits of digitization, cf. already Stockhausen (2020) 124, note 10. However, digitization can also be found in unexpexted places, such as the TEI guidelines, where the relevant section of the guidelines, see https://tei-c.org/release/doc/tei-p5-doc/en/html/TC.html (Accessed: 18 June 2024), is called "Critical Apparatus" rather than something like "Textual Variation," using terminology of the critical print edition.

potentially has similar consequences for contemporary research as this type of transition had for scholars of the early modern period.

## 2. What is needed for a Digital Edition?

### 2.1 "FAIR" – Findable, Accessible, Interoperable, Reusable

To fulfill their potential, digital editions must be implemented according to the "FAIR principles,"[17] i. e., they must be findable, accessible, interoperable, and reusable. Ideally, digital editions are available as individual texts and, where applicable, as a corpus in open access or as open data under an open license via API (programming interface) and/or as a download, given that most of the FAIR principles can be implemented under these conditions. For digital editions (as data and/or in their presentation form) to be used and evaluated, they must be addressable and able to be bibliographed, preferably in such a way that they are permanently accessible using *one* link and able to be cited with the same web address,[18] i. e., have permalinks, the permanence of which must be ensured by the providing institution (academic organization, library, publisher). Permanent accessibility is the greatest challenge of digital editions beyond the actual editing work.[19] As a result, digital editions not only consist of the edition data itself, but also include *meta*data for the data and for the various subsequent uses and forms of presentation. This metadata ensures clarity for the recipients (whether human or computer) regarding the contents of the edition, to what extent, in which format, under which conditions, and by whom the edition was created and where it can be found.[20] In addition to the metadata, the editorial standards and (individual) decisions as well as the technical workflows and solutions should be documented as comprehensively as possible.[21]

17 See https://www.go-fair.org/fair-principles (Accessed: 18 June 2024). Cf. Wilkinson et al. (2016).

18 In competition with printed editions, the issue of long-term availability and citation is fraught with considerable difficulties, as digital editions should in principle be available permanently, spanning decades and centuries, just like printed editions, but the actual experience with them has been the opposite, because digital projects are often no longer available very soon after the end of the project and the expiration of funding. In any case, long-term availability means long-term maintenance to an extent that far exceeds what is necessary for printed material.

19 Of course, printed editions (and their sources) have also been lost due to natural disasters or human influence, and their existence is known only due to their metadata.

20 Standardized vocabulary, such as Dublin Core, see https://www.dublincore.org/specifications/dublin-core (Accessed: 18 June 2024) or other library standards, should also be used for metadata.

21 There remains a lack of standards in this regard.

Since digital editions can be corrected and updated much more easily due to their digital nature (see below in chap. 3), i.e., new editions can occur much more frequently than in print, versioning is another important aspect to consider.[22]

## 2.2 Structural Requirements

Standards should be followed in all aspects of the edition. Doing so guarantees interoperability and enables subsequent use (and preferably established and not outdated). Individual solutions,[23] especially if they are not documented, and innovation for innovation's sake,[24] should therefore be avoided wherever possible.

Standardization is even more important given digital editions involve much more effort than printed editions,[25] even in the absence of well-established processes and involved parties, and a large part of this additional effort cannot simply be transferred to other parties such as publishers (layout, production, distribution) or libraries (metadata, citation, long-term availability), at least not yet. Publishers – including those relevant for theological publications – currently offer neither the necessary editing and publication workflows nor the technical infrastructure;[26] rather, they offer digitized books in PDF format as the standard (cf. Arnold & Döhnert 2024). At the same

22 Versioning is best based on a Version Control System (VCS), as doing so also makes tracking changes easier.

23 A compromise must be found between the best possible modeling of one's own edition and the greatest possible connectivity to editions that are thematically or chronologically similar or based on comparable sources. Although it may be or seem to be more often in the interest of third-party funders, it should also be considered whether one's own edition project can be published not only on a separate (project) website, but also in a corpus of similar digital editions, since doing so also facilitates subsequent use.

24 Innovation for innovation's sake is a result of digitality (in addition to the practice of current research funding), claiming innovation is easier to achieve and is in demand; however, innovation is a hindrance to the aspect of long-term availability and reusability, because completely new technologies may be used that cannot establish themselves and are therefore not supported or that may require so much technical infrastructure that they cannot be provided permanently by the sponsors.

25 However, the additional work is not limited to publication and ensuring permanent usability. The work also extends to the actual editorial work if digital editions are to offer *more* than their printed counterparts, which ultimately also contain *more* information and therefore require more effort.

26 One exception thus far is Brill, which has set up its own publication platform for digital editions based on the *Scaife Viewer* (https://scaife.perseus.org) with *Brill's Scholarly Editions* (https://scholarlyeditions.brill.com). Both addresses were accessed on 18 June 2024. However, even in this case, only retro-digitized editions and no *born digital* new editions are available; further development remains to be seen in view of the fee-based offer, especially regarding the aspects of interoperability and reusability. It is becoming apparent that all major academic publishers that publish printed editions will develop concepts and solutions for digital editions in the foreseeable future.

time, digital editions as a special type of publication are part of the wider context of the current discussion about *open science* and *open access.* These discussions are also part of a larger shift in publication structures away from commercial publishers and towards libraries and universities or academic organizations' own publishing initiatives, including infrastructures that go beyond pure publication.[27] In addition, there are specialized service providers who have the necessary technical capabilities, e.g., for XML and its further processing, databases, web/application programming or user experience (UX). Nevertheless, the responsibility of the individual editing project currently remains great and is best solved collaboratively. The requirements for technical skills, software, infrastructure, and distribution are complex and require ongoing maintenance, which not only includes the necessary updates, but also the provision of server infrastructure and its financing.

## 3. Opportunities Presented by Digital Editions

If digital editions implement the "FAIR Principles" and are published in *open access* and as *open data,* then there are new possibilities created compared to print editions.[28] They are – provided the user has internet access[29] – available worldwide and can be used by anyone. Digital tools, either those offered by the editors in the presentation layer of the edition itself or applied to the data by the user independently, enable access not only for specialists or a wider specialist audience, but for anyone interested.

Digital editions can accommodate different user scenarios and capabilities by allowing users to interactively show or hide different functionalities or edition layers according to their own preferences. The text of the edition can be searched and analyzed in a variety of ways – ultimately limited only by the functionalities of existing tools or the user's programming skills. Comments, annotations of entities, and other enrichments of various kinds, such as the integration of digital facsimiles and links to other offers on the internet such as databases, dictionaries, encyclopedias, or editions (including digitized books) offer potentially unlimited information. Users can also further enrich this information with their own annotations and additional links, either in the original edition context, provided the editors enable or allow additions

27 Libraries like the Herzog August Library in Wolfenbüttel, the Darmstadt University and State Library, and the Heidelberg University Library are already playing an important infrastructural and editorial role in digital editions of medieval, early modern, and modern texts.

28 If digital editions do not comply with the FAIR principles and/or are not published in *open access* or as *open data,* then they may still offer *more* than printed editions, e.g., a full-text search ability, but, at the same time, there is a risk that long-term availability is not guaranteed.

29 In this respect, digital editions are again limited, whereby not only the availability of internet access, but also censorship must be considered. On the other hand, the usability of printed editions can be seen as even more restricted by censorship and/or the need for well-equipped libraries.

as a further form of user interaction, or through subsequent republication. Corrections or improvements are also easily possible.[30] Users can (more) easily process the edition data for new questions that cannot be answered by simply reading and develop and apply new digital methods in general. At the same time, a digital edition can be linked to publications from other research projects in the sense of *linked open data.* In general, digital editions are characterized by a pronounced processualism in their production as well as in their use, and thus their product is in principle fluid in contrast to static print.

Digital editions offer another decisive advantage over printed editions: they are characterized by greater verifiability because they provide *raw* data from the editing process (such as transcriptions or collations) and can document the transmission and editorial decisions without space restrictions. Editors should make use of this possibility in the interests of transparency and for the sake of better editions.

## 4. Conclusion: What is still missing?

### 4.1 Education

To exhaust the potential of a digital edition, not only technically skilled editors are required, but above all a digitally literate user. The latter uses the digital edition (and the tools offered) with understanding and, depending on their profile or purpose of use, need not limit themselves to the presentation provided by the editors. The user can examine the data in the edition themselves for their own research questions using tools other than those offered.[31]

### 4.2 Tools

Digital editions in theological disciplines often deal with source materials or traditional contexts and are available in languages or language levels for which tools such as text recognition or natural language processing are not yet available or not available in sufficient quality.

30 Assmann & Sahle (2008) emphasize the new role of reviews of digital editions, since criticism and suggestions for improvement made in reviews, in contrast to printed editions, can actually lead to improvements because, unlike in printed editions, there is more than the theoretical possibility of a "new edition."

31 Training and further education are particularly important for theological research, not least because the requirements of research funding for edition projects often exceed the capabilities of those involved and "the digital" should not and cannot simply be delegated entirely to IT or DH departments.

### 4.3 Cooperation and Standardization

Since theology has a long tradition as a science (orig. "Wissenschaft"), many relevant sources are already available in (printed) editions. The availability of printed resources is one reason why what is now being edited digitally often concerns either new discoveries or subjects that have not yet been well researched at the margins of the disciplines. There seems to be greater potential for innovation in these disciplines. In addition, third-party funding can motivate each edition project to publish its edition in its own web publication, which is then often a solitaire or presents itself as the proverbial silo whose contents cannot be examined in connection with other editions, not least because only in comparatively few cases is the data made accessible in addition to the presentation. In general, there is still a lack of overarching research options or at least a uniform editorial approach and (minimum) standards for the user interface, i.e., the large edition series known from book printing with their uniform editorial standards and layouts are missing.[32] Sometimes even the standard TEI makes interoperability between edition projects more difficult because, as a historically evolved and, above all, highly diverse standard, TEI offers several ways of labeling a phenomenon to be edited.

### 4.4 Credibility and Recognition

Digital editions in the field of theology have so far often been published as *hybrid* editions, i.e., in addition to the digital presentation, there is also a printed version of the edition. A potential reason for this hybrid publication strategy is not only the concern about the long-term availability and addressability of the digital edition, which is difficult to guarantee, but also the fact that digital publications are often not yet accepted by scholars where the digital editions are cited (and not their printed derivative) or generally recognized as scholarly publications.

32 It remains to be seen whether initiatives such as the *National Research Data Infrastructure* (https://www.nfdi.de) and, in particular, *Text+* (https://www.text-plus.org) can provide a remedy.

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