Available online at www.sciencedirect.com

ScienceDirect

Historia Mathematica 43 (2016) 87–97

HISTORIA MATHEMATICA

www.elsevier.com/locate/yhmat

Editing and reading early modern mathematical texts in the digital age

Rosanna Cretney

Department of Mathematics and Statistics, The Open University, Milton Keynes, Buckinghamshire, MK7 6AA, UK

Available online 27 May 2015

Abstract

The advent of digital technology has brought a world of new possibilities for editors of historical texts. Though much has been written about conventions for digital editing, relatively little attention has been paid to the particular question of how best to deal with texts with heavily mathematical content. This essay outlines some ways of encoding mathematics in digital form, and then discusses three recent digital editions of collections of early modern mathematical manuscripts.

MSC: 01A85

Keywords: Digital scholarly editions; TEI; TeX; MathML; OpenMath

1. Introduction: digital tools and languages for historical mathematics

Over the last 30 years, the ways in which historians work have undergone a fundamental change. It is a rare historian nowadays who does not use a computer in at least some aspect of his or her work, be it for writing, looking up material in archive or library catalogues, or reading primary or secondary sources through electronic means. Modes of publishing have also changed, and whereas for hundreds of years we have been tied to the print medium and its intrinsic linearity, the digital turn is now opening up new avenues for innovative ways in which to publish scholarly work. The theory and practice of such new types of publication is part of the emergent field of digital humanities.[1]

E-mail address: rosanna.cretney@open.ac.uk.

[1] Digital scholarly publishing and editing is only one of many issues being explored in depth within current digital humanities scholarship. The present paper will discuss only one aspect of this issue: namely, its implications in the specific case of the history of mathematics. I refer the interested reader to (Gold, 2012) for wider-ranging discussion of digital editions, and for an overview of the current state of the digital humanities in general.

http://dx.doi.org/10.1016/j.hm.2015.05.002
0315-0860/

In particular, any historian looking to produce a new edition of a primary source or collection of primary sources has an important choice to make: should he or she opt for a print edition, a digital edition, or some combination of the two? Each has its own advantages and disadvantages. Print editions are durable, and one knows that an edition produced in this way will still be extant and readable for as long as a copy survives. Many readers also prefer to have a physical copy of the work they are reading and referring to, finding it less straining on the eyes and easier to navigate.

On the other hand, a digital edition is more flexible for the editor and the reader: rather than choose one primary version of the text to offer to the reader, possibly augmented with alternative readings described in footnotes or marginal notes, the editor can simply present several versions of the text and allow the reader the freedom to choose which is most suitable for his or her purposes. Iliffe (2004, 33) has referred to the move towards 'unediting' scholarly manuscripts: that is, presenting the reader with something as close as possible to the original manuscript, with minimal editorial modifications so as to present all the nuances of the original document. The editor is also no longer required to choose for the reader a linear path through the material: he or she can suggest multiple different reading orders, each potentially as valid or useful as the other. For example, the reader of an edition of collected letters might choose to read only one correspondence, or read all correspondence within a particular time period, or read all correspondence on a particular subject; though this would be possible with a print edition, it would require considerably more effort on the part of the reader to select and reorder the material he or she wants. The possibilities are limited only by the imaginations of the editor and reader. However, there is some concern over how durable a digital edition is. Digital formats that were used as standard as little as twenty years ago, such as floppy disks and VHS tapes, are now becoming unusable due to the necessary hardware becoming extinct. In view of these new potential uses of edited texts and durability concerns, how can we ensure that the files produced are as useful as possible and remain readable in the future? And in particular, how can mathematics be most usefully encoded in digital format?

There is, thus far, no entirely satisfactory answer to this question. However, we can go some way towards answering it by using standardised data formats that are easy to convert automatically into new formats when needed; for example, to upgrade for compatibility with a new system. For text storage, the leading standard is TEI-XML. Extensible Markup Language (XML) is a plaintext-based metalanguage for creating markup languages to store data. Different types of XML can be used to encode different types of data; TEI-XML, the particular type of XML I will focus on in this article, was proposed by the Text Encoding Initiative (TEI) group as a set of guidelines for the encoding of texts and their metadata, and has become a widely adopted standard way to present digitally encoded texts (TEI Consortium, 2007).

An XML document consists of a hierarchy of nested *elements* which can contain data. So, for example, one might encode a name in TEI-XML as follows:

```
<name>
  <forename>
    Leonhard
  </forename>
  <surname>
    Euler
  </surname>
</name>
```

Here, `name` is an element with two *child elements*, `forename` and `surname`; the opening tag `<name>` denotes the beginning of the `name` element, and the closing tag `</name>` denotes its end. If necessary, elements can be given *attributes* to encode extra information about the element without adding extra child elements.