An introduction to XML

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From an original document by Susan Hockey

Version 1.0

Aims and Outcomes

- Principles and role of structured generic markup
- Create well-formed and valid XML documents
- Write DTDs and Schemas
- Deliver XML documents over Web
- Apply style sheets

- Assess and evaluate role of XML for management and delivery of electronic information

What is XML?

- OED:
  - "Extensible Markup Language, a standard for the mark-up of electronic documents <remove>for display on the Web</remove>, which is based on SGML and allows users to customize their own tags."
- SGML:
  - Standard Generalized Markup Language
  - Describe the document rather than how it should be displayed

XML: Extensible Markup Language?

- Extensible – yes
- Markup – yes
- Language – not really
  - A framework for creating languages
  - Languages used to structure text files and describe their content
  - NOT a programming/scripting language
- Intended to be used by machines, but can be read (and understood) by humans

XML: Extensible Markup Language?

- Meta-language: a language used to describe other languages.
- International standard for the exchange of data

- Markup (encoding): adding a level of interpretation of text.
- Text already has markup (punctuation, spaces, position on the page)
- Encoding makes this explicit

Why is it important?

- Interoperable
  - Machine and software independent
  - ASCII or Unicode
  - Separate the data from the software
- Reusable
  - Not presentation dependant
  - Encode structure/content of the document not its appearance
- It saves you a lot of time and money

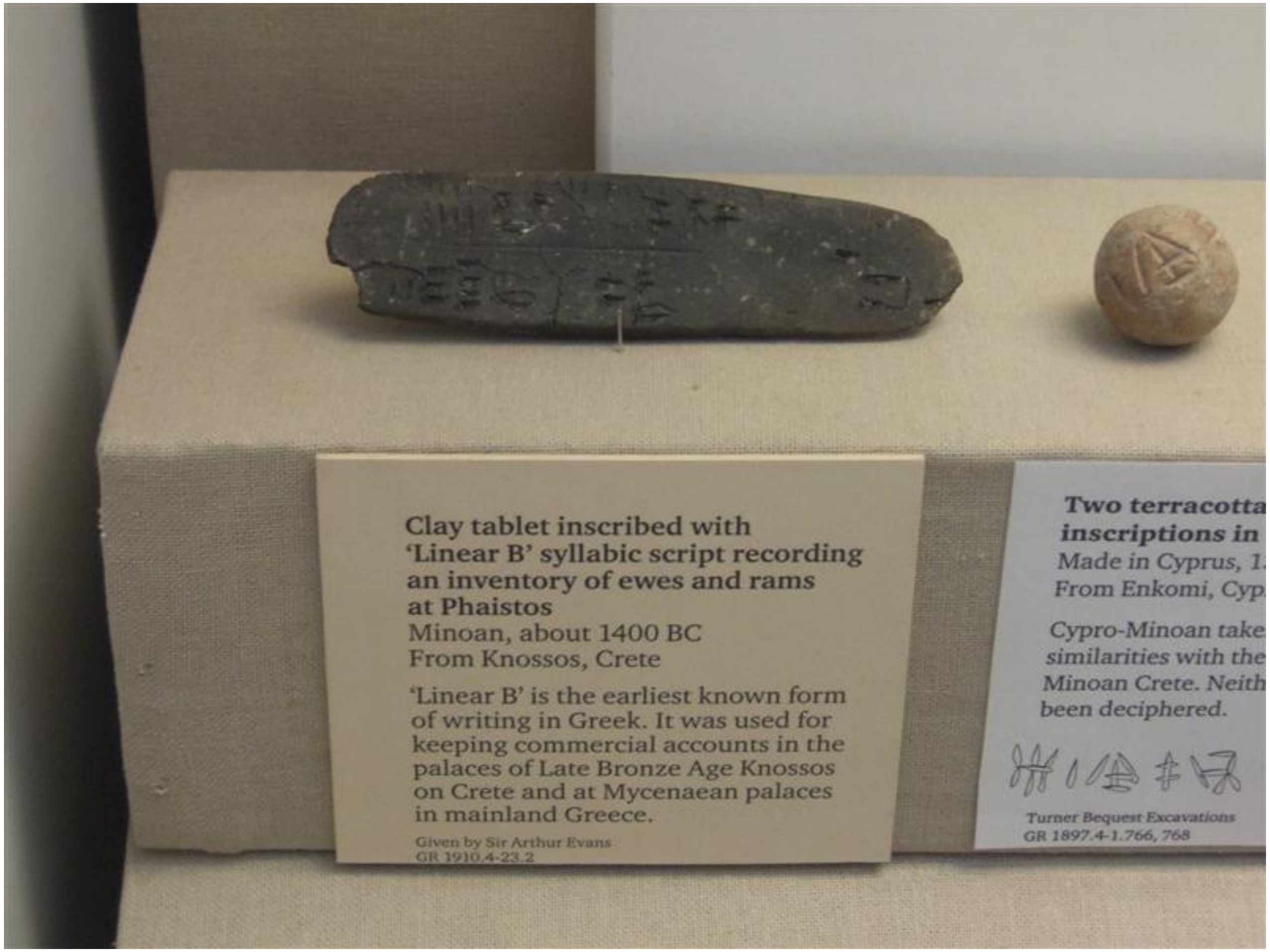
Markup?

- Nothing new: as we shall see
  - Proofreaders
  - Typesetters
  - Leiden convention (epigraphic texts)

Humanities research is heavily TEXT orientated

- What is a text?
  - – A construct created by the reader?
  - – It is more than just the words on the page.

- Book culture
- We know the rules
- Punctuation, space have meaning (to us)
- How would we render this electronically?



Clay tablet inscribed with 'Linear B' syllabic script recording an inventory of ewes and rams at Phaistos
Minoan, about 1400 BC
From Knossos, Crete

'Linear B' is the earliest known form of writing in Greek. It was used for keeping commercial accounts in the palaces of Late Bronze Age Knossos on Crete and at Mycenaean palaces in mainland Greece.

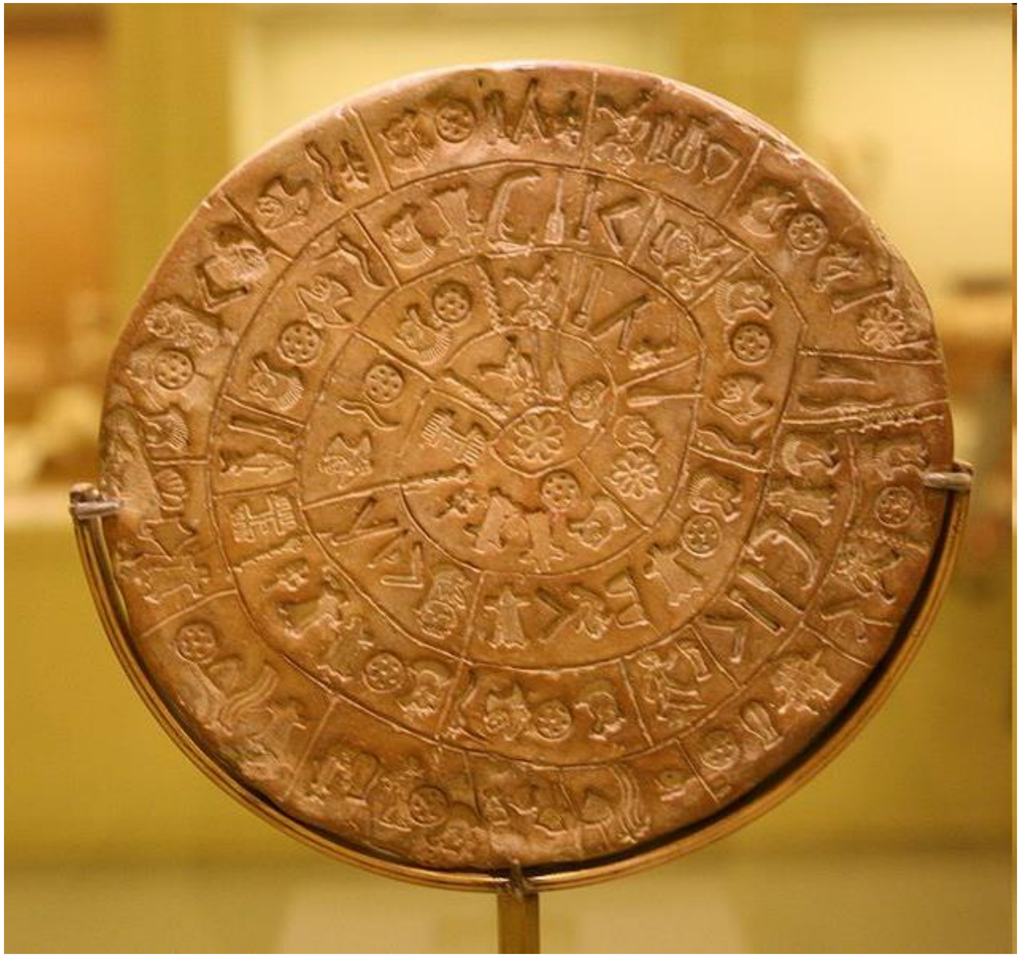
Given by Sir Arthur Evans
GR 1910.4-23.2

Two terracotta
inscriptions in
Made in Cyprus, 1
From Enkomi, Cyp

Cypro-Minoan take
similarities with the
Minoan Crete. Neith
been deciphered.

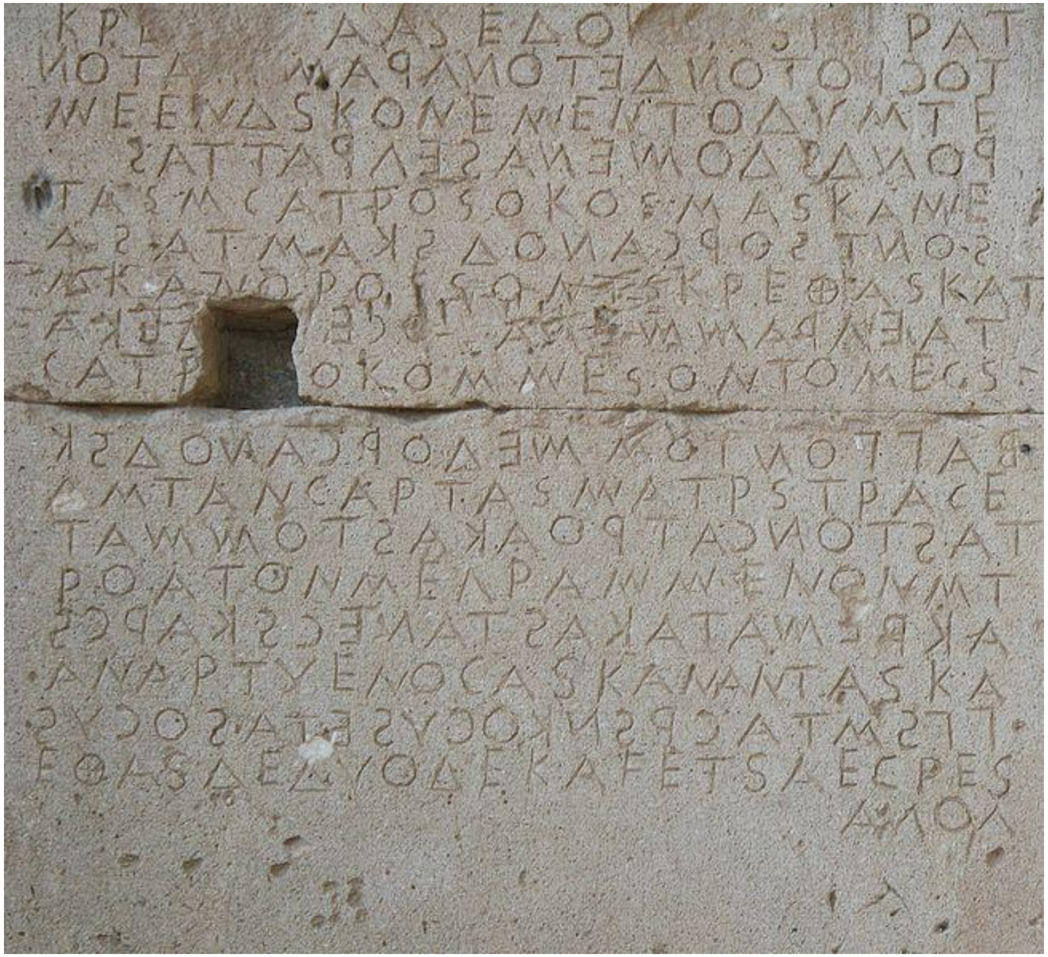
Turner Bequest Excavations
GR 1897.4-1.766, 768

Clay tablet inscribed with 'Linear B'. Minoan c.1400BC Knossos. British Museum (image: Simon Mahony)



Phaistos Disc (side A) poss 1700BC: Heraklion Archaeological Museum

(image from Wikipedia – Wikimedia commons).

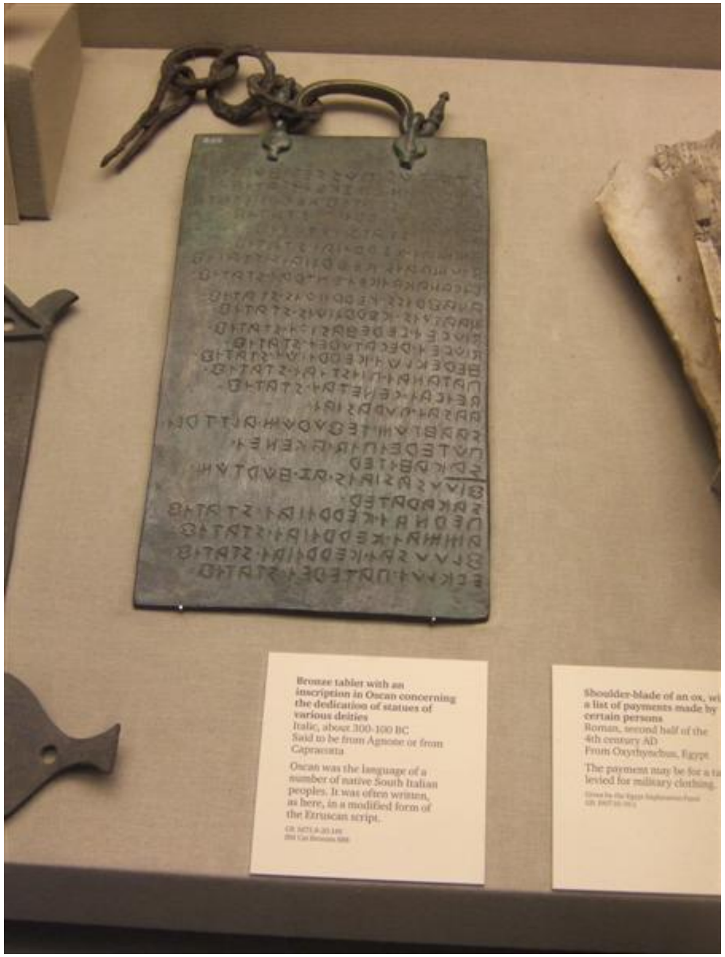


***Boustrophedon*: (like an ox ploughing a field) the direction of each line is reversed. Gortyn law code inscription. Crete 5BC. Image: [Wikimedia Commons]**

Bronze tablet with an Oscan dedication.

British Museum

(image: Simon Mahony)

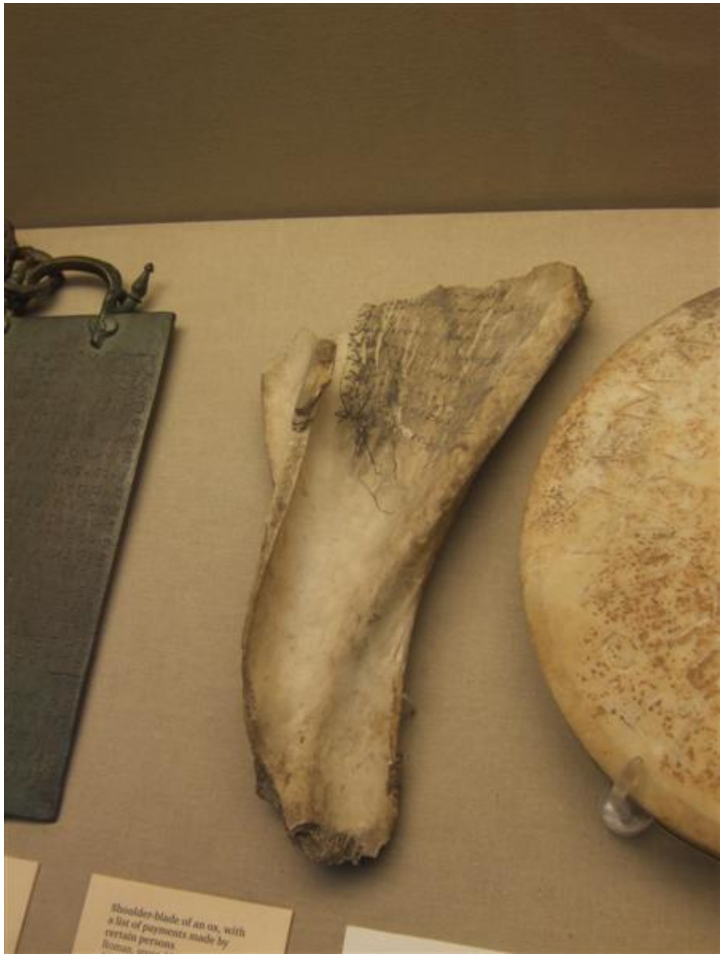

Bronze tablet with an inscription in Oscan concerning the dedication of statues of various deities
Italic, about 300-100 BC
Said to be from Agnone or from Capracotta
Oscan was the language of a number of native South Italian peoples. It was often written, as here, in a modified form of the Etruscan script.
Shoulder-blade of an ox, wi
a list of payments made by certain persons
Roman, second half of the 4th century AD
From Oxyrhynchus, Egypt
The payment may be for a ta
levied for military clothing.

Shoulder blade of an ox,

with a list of payments.

British Museum

(image: Simon Mahony)



Roman writing instruments and materials.
British Museum (image: Simon Mahony)

Texts or documents

- Is the object a text or document?
- What is the difference?

- Text: the letters or the ideas therein?

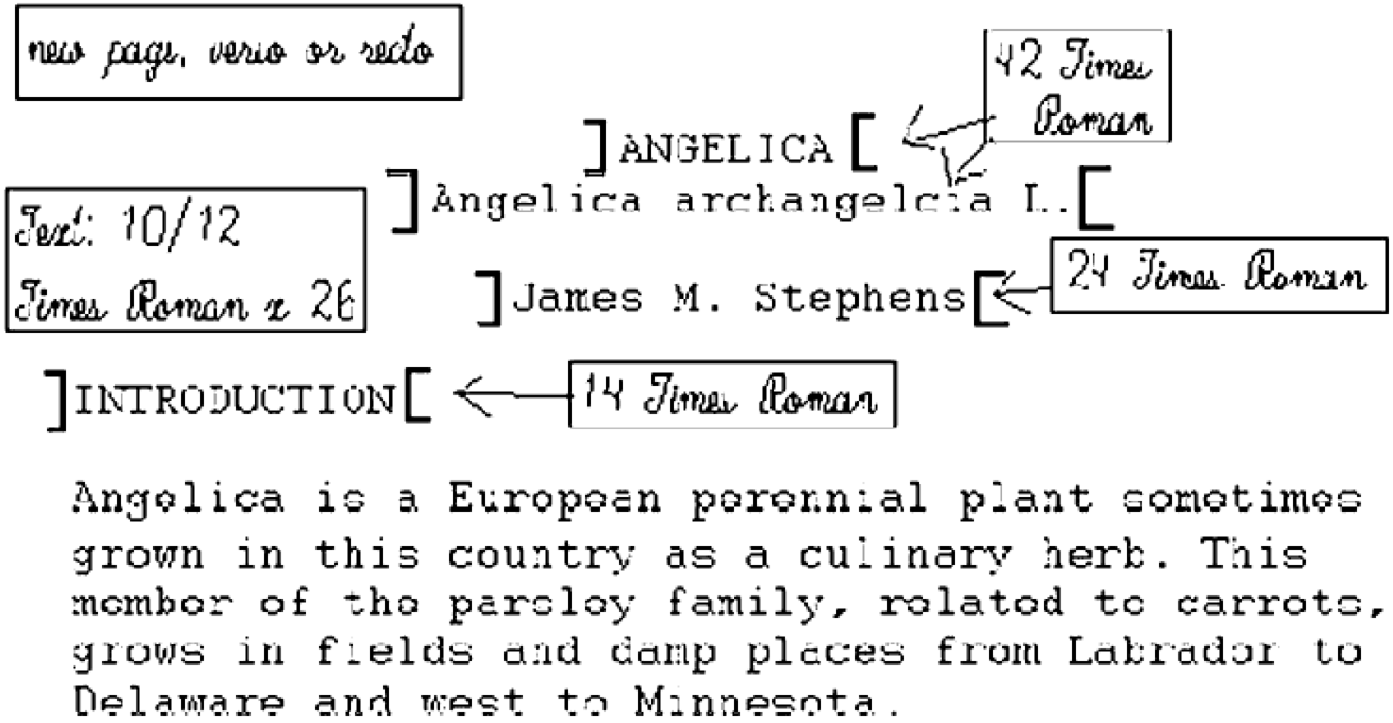
- Markup makes explicit things that we understand implicitly
- Once made explicit they can be processed

Markup

- Adding some additional information
- Disambiguate (cf interactive concordance software)
- Needs to be able to be *read* by computer AND humans

- WYSIWYG
  - word processor (hidden formatting)
  - Endnote

Typesetters markup


new page, verso or recto
42 Times Roman
Text: 10/12 Times Roman x 26
24 Times Roman
14 Times Roman

ANGELICA

Angelica archangelcia L.

James M. Stephens

INTRODUCTION

Angelica is a European perennial plant sometimes grown in this country as a culinary herb. This member of the parsley family, related to carrots, grows in fields and damp places from Labrador to Delaware and west to Minnesota.

HTML vs XHTML

- HTML – displays your data
- XHTML – describes your data (HTML + XML)
  - Subset of XML family

- XHTML
  - separates style from content
  - structural and semantic markup
  - stricter syntax (limited elements)

- CSS – used to style XHTML pages

Example of the difference

I *really* liked the characterisation of Ajax in Homer’s *Iliad.*

- HTML does not allow us to distinguish between the different uses of the italics
- With XHTML we can mark these up differently to differentiate between emphasis and the book title.
- Using XML we can also add more information if we wish

HTML:

```
<p>
I <i><ul>really</ul></i> liked the characterisation of Ajax
in Homer’s <i><ul>Iliad</ul></li>.
</p>
```

XHTML:

```
I <em>really</em> liked the characterisation of Ajax in
Homer’s<span class="title">Iliad</span>.
```

Generic Markup

- Used by early text formatting programs
- Markup identifies the content, not the format
  - Heading: not 14point, bold Times
- Waterloo Script – old formatting program
- LaTex – used for mathematics and science materials

SGML – Standard Generalized Markup Language

- International standard in 1986
- ISO 8879:1986
- Not a markup scheme in itself
- A syntax for defining markup schemes
- Assumes (mostly) that a document is a nested or hierarchic structure

- A descendant of IBM's Generalized Markup

SGML

- Separation of content and design
- Same document can be used for many different purposes
- Archival form of the material (simple text file)
- Separate the document from the processing
- Content-based markup
- Functionality is in the processing software

Development of XML

- Simplification of SGML
- Developed by a small group led by Jon Bosak of Sun Microsystems
- Became a World Wide Web Consortium recommendation in February 1998
- Now many associated activities in W3C and elsewhere

Not just the Web

- Allows transformation to multiple outputs
- Print publication
- Printable view on Web
- Create indices
- Table of contents
- Checking pages
- PDF
- Text

Where is XML used?

- Word processors (eg MS Word 2007)
- Google Maps
- ATM
- Banks exchanging data
- Petrol station
- Anywhere data needs to be transmitted

What is XML?

- A simple syntax for defining a markup scheme
- Elements
- Attributes
- Values
- Entities

- Document structures

Document Structures

- XML documents are tree structures
- Composed of nested structures of elements
- Some elements may also have attributes

(Image: Simon Mahony)

Made up of:

- Elements
- Attributes
  - Values
- Entities

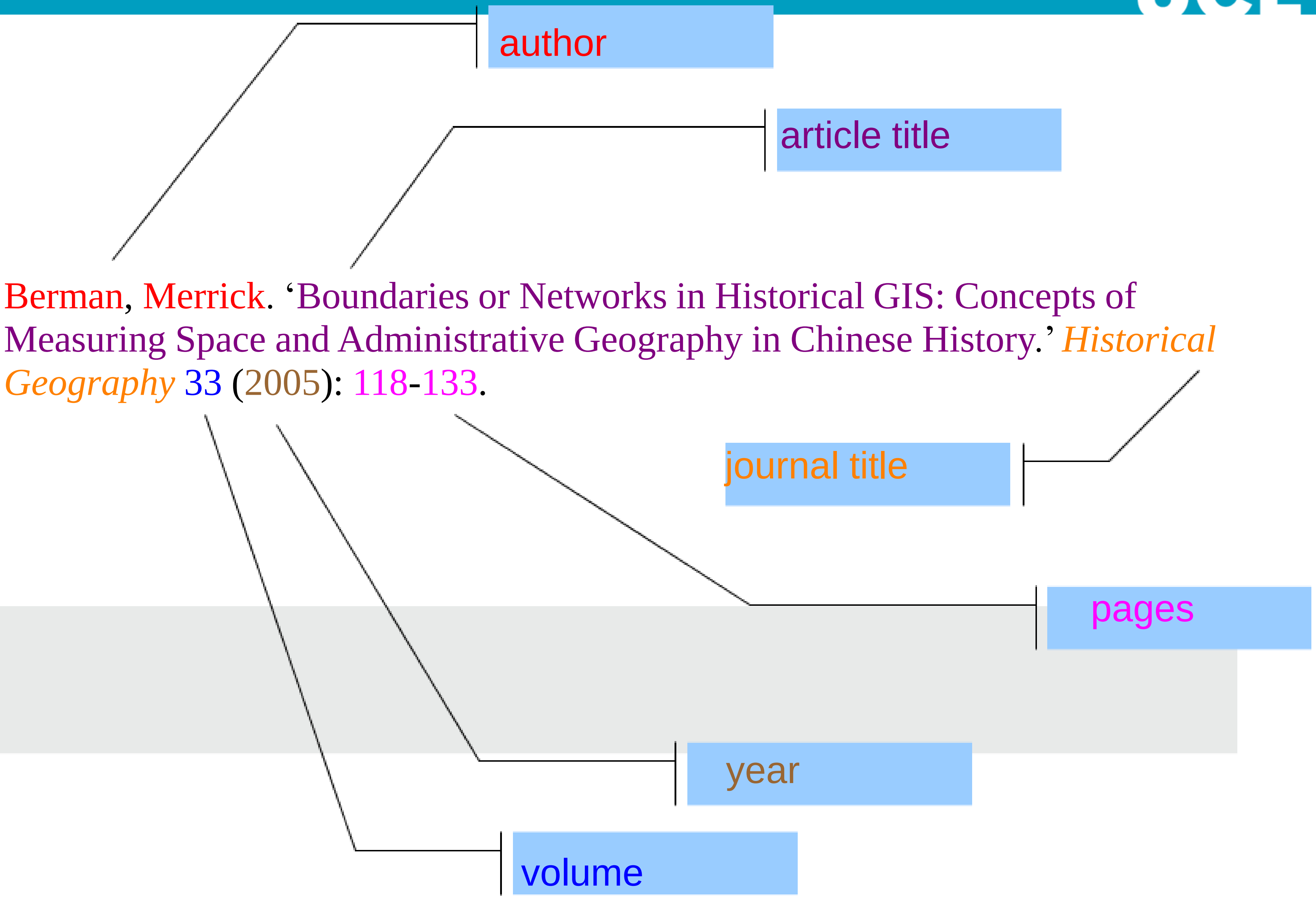
Document Analysis

- First stage of an XML (and SGML) project
- Determine what are the important features within the document(s)
  - This will depend to some extent on the nature of the document
  - What is it you (or others) are interested in?
- Determine the relationships between the features
- Produce a tree structure with names for the elements

E.g. Bibliographic entry

Berman, Merrick. 'Boundaries or Networks in Historical GIS: Concepts of Measuring Space and Administrative Geography in Chinese History.' *Historical Geography* 33 (2005): 118-133.

- This example is adapted from an original by Tom Elliott (NYU) and acknowledged with thanks.
  (https://docs.google.com/present/view?id=drn6nzs_30d9vm77dt)



author

article title

Berman, Merrick. ‘Boundaries or Networks in Historical GIS: Concepts of Measuring Space and Administrative Geography in Chinese History.’ *Historical Geography* 33 (2005): 118-133.

journal title

pages

year

volume

Start marking up with XML

<bibl>

Berman, Merrick. 'Boundaries or Networks in Historical GIS: Concepts of Measuring Space and Administrative Geography in Chinese History.' Historical Geography 33 (2005): 118-133.

</bibl>

Adding element: <author></author>

<bibl>

<author>Berman, Merrick</author>. 'Boundaries or Networks in Historical GIS: Concepts of Measuring Space and Administrative Geography in Chinese History.'

Historical Geography 33 (2005): 118-133.

</bibl>

Adding <title></title> but more than one title

<bibl>

<author>Berman, Merrick</author>. '<title>Boundaries or Networks in Historical GIS: Concepts of Measuring Space and Administrative Geography in Chinese History</title>.' Historical Geography 33 (2005): 118-133.

</bibl>

```
<bibl>
<author>Berman, Merrick</author>. '<title
level="a">Boundaries or Networks in Historical GIS:
Concepts of Measuring Space and Administrative
Geography in Chinese History</title>.' Historical
Geography 33 (2005): 118-133.
</bibl>
```

title levels:

a = *analytic* title (article, poem, or other item published as part of a larger item)

j = *journal* title

m = *monographic* title (book, collection, or other item published as a distinct item,
including single volumes of multi-volume works)

s = *series* title

u = title of *unpublished* material (including theses and dissertations unless published by a commercial press)

XML: element > attribute > value

```
<bibl>
<author>Berman, Merrick</author>. '<title
level="a">Boundaries or Networks in Historical
GIS: Concepts of Measuring Space and
Administrative Geography in Chinese
History</title>.' <title level="j">Historical
Geography</title> 33 (2005): 118-133.
</bibl>
```

Element to define volume number

```
<bibl>
<author>Berman, Merrick</author>. '<title
level="a">Boundaries or Networks in Historical
GIS: Concepts of Measuring Space and
Administrative Geography in Chinese
History</title>.' <title level="j">Historical
Geography</title>
<biblScope type="vol">33</biblScope> (2005):
118-133
</bibl>
```

Date element

```
<bibl>
<author>Berman, Merrick</author>. '<title
level="a">Boundaries or Networks in Historical
GIS: Concepts of Measuring Space and
Administrative Geography in Chinese
History</title>.' <title level="j">Historical
Geography</title>
<biblScope type="vol">33</biblScope>
(<date>2005</date>): 118-133
</bibl>
```

Page numbers

```
<bibl>
<author>Berman, Merrick</author>. '<title
level="a">Boundaries or Networks in Historical
GIS: Concepts of Measuring Space and
Administrative Geography in Chinese
History</title>.' <title level="j">Historical
Geography</title>
<biblScope type="vol">33</biblScope>
(<date>2005</date>): <biblScope type="pp">118-
133</biblScope>.
</bibl>
```

Punctuation?

```
<bibl>
<author>Berman, Merrick</author>. '<title
level="a">Boundaries or Networks in Historical GIS:
Concepts of Measuring Space and Administrative
Geography in Chinese History</title>.' <title
level="j">Historical Geography</title>
<biblScope type="vol">33</biblScope>
(<date>2005</date>): <biblScope type="pp">118-
133</biblScope>.
</bibl>
```

```
<bibl>
<author>Berman, Merrick</author>
<title level="a">Boundaries or Networks in
Historical GIS: Concepts of Measuring Space and
Administrative Geography in Chinese
History</title>
<title level="j">Historical Geography</title>
<biblScope type="vol">33</biblScope>
<date>2005</date>
<biblScope type="pp">118-133</biblScope>
</bibl>
```

Author?

```
<bibl>
<author>Berman, Merrick</author>
<title level="a">Boundaries or Networks in Historical
GIS: Concepts of Measuring Space and
Administrative Geography in Chinese History</title>
<title level="j">Historical Geography</title>
<biblScope type="vol">33</biblScope>
<date>2005</date>
<biblScope type="pp">118-133</biblScope>
</bibl>
```

Deconstruct name into:
surname / forename

```
<bibl>
<author>
<surname>Berman</surname>
<forename>Merrick</forename>
</author>
<title level="a">Boundaries or Networks in Historical GIS:
Concepts of Measuring Space and Administrative Geography in
Chinese History</title>
<title level="j">Historical Geography</title>
<biblScope type="vol">33</biblScope>
<date>2005</date>
<biblScope type="pp">118-133</biblScope>
</bibl>
```

(Add unique ID and wrapper)

```
<listBibl>
….
<bibl xml:id="berman2005">
<author>
<surname>Berman</surname>
<forename>Merrick</forename>
</author>
<title level="a">Boundaries or Networks in Historical GIS:
Concepts of Measuring Space and Administrative
Geography in Chinese History</title>
<title level="j">Historical Geography</title>
<biblScope type="vol">33</biblScope>
<date>2005</date>
<biblScope type="pp">118-133</biblScope>
</bibl>
…
</listBibl>
```

Anything else?

- Editorial decisions
- How much detail is required?
- How much detail can you afford?
  - Time = money and funding is limited

XML

- Texts are already encoded (book culture)

- For markup, texts need to be de-coded (by us)

- Then
  - Re-encoded in an unambiguous way
  - Read by both computers and humans

Transformation (via XSLT)

- For format (HTML, PDF etc)
- For editions (critical, diplomatic, etc)
- For collations (indices, TOCs, etc)
- Checking pages

Successful standard

- Data standard for many formats
- Underlying data: MS Word 2007 (.zip file)
- Platform independent
  - Plain text with .xml file extension
- Store information
  - Future-resistant
- Importantly: widely supported scholarly community (TEI)
  - Fosters interchange and collaboration
  - Open Source

Document analysis

- Study documents
- Construct an abstract model
- Define objectives
- Produce an encoded representation

To recap

What is XML?

- A simple syntax for defining a markup scheme
- Elements
- Attributes
  - Values
- Entities
- Document structures

Document Structures

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- Composed of nested structures of elements
- Some elements may also have attributes

Image source: Simon Mahony

Element / Attribute (value) / Entity

- Element: <title> <author> <date>
  - Syntax <title> … </title>
- Attribute: modify the elements
  - Syntax attribute-name="attribute-value"
  - <element attribute-name="attribute-value">some text</element>
- Entities: Non ASCII characters
  - Special characters in XHTML
  - eg &amp; &eacute; etc
  - Text to be expanded (eg &UCL;)

Elements and Document Structures

- Elements can be repeated
- Elements can be optional
- Elements can contain other elements
- Elements can contain only text (the leaves of the tree)
- Elements can have mixed content – text and/or other elements

Elements

- Normally, elements have some content
- Start and end tags

<title> Pride and Prejudice</title>

- End tags MUST be present in XML
- rest of the file is PCDATA
  - ie Parsed Character data = untagged text
- File is a simple text file

Empty Elements

- Elements without any content

- <image filename="image.jpg" />
- <br/ >

- Mark a position in a document, rather than surrounding some text (cf. XHTML)
  - e.g. a page break

Attributes

- Further modify elements
- Attributes are always in quotes
  <name type="place">London</name>
  <name type="personal">Simon</name>
- Elements take more than one attribute type
  - eg <name language="english">
  - <name ID="26">

- This could also be expressed as
  <name><person>Simon</person></name>

Must have a nested Structure

- An XML document is a tree structure of nested elements
- Elements can repeat
- The tree can be any depth
- The document must have an outer (root) element

Nested structure

```
<body>

        <p>
    <strong><em>Some
text</em></strong>                ✓

    <strong><em> Some
text</strong></em>                ✗
        </p>

</body>
```

Nested structure: example from bibliography

```
<bibl>
            <author>
                        <surname>Berman</surname>
                        <forename>Merrick</forename>
            </author>
            <title level="a">Boundaries or Networks in
Historical  GIS: Concepts of Measuring Space and
Administrative    Geography in Chinese History</title>
            <title level="j">Historical Geography</title>
            <biblScope type="vol">33</biblScope>
            <date>2005</date>
            <biblScope type="pp">118-133</biblScope>
</bibl>
```

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