An introduction to XML and the TEI

Lou Burnard Consulting

Goals of this session

1. What is a text ? what is a document ?
2. What is "markup" ?
3. What is XML markup ? Why is it so important ?

The digital turn

The humanities are all about text

- (non-digital) books, manuscripts, archival papers...
- ... as well as other -- increasingly digital -- cultural manifestations such as sounds, images, blogs, tweets ...

The digital humanities are all about digital technologies and techniques for manipulating such manifestations in an integrated way

Markup (aka encoding or tagging) is one of the key technologies behind such integration.

Texts and digital texts

Texts are four dimensional:

- a document has a physical presence with visual aspects which may be transferred more or less automatically from one physical instance to another
- a text has linguistic and structural properties which may be transcribed, translated, and transmitted with some human intervention
- a text conveys information about the real world, which may be understood (or not), annotated, and even used to generate new texts
- A text usually has associated metadata, documenting what it is, where it came from, etc.

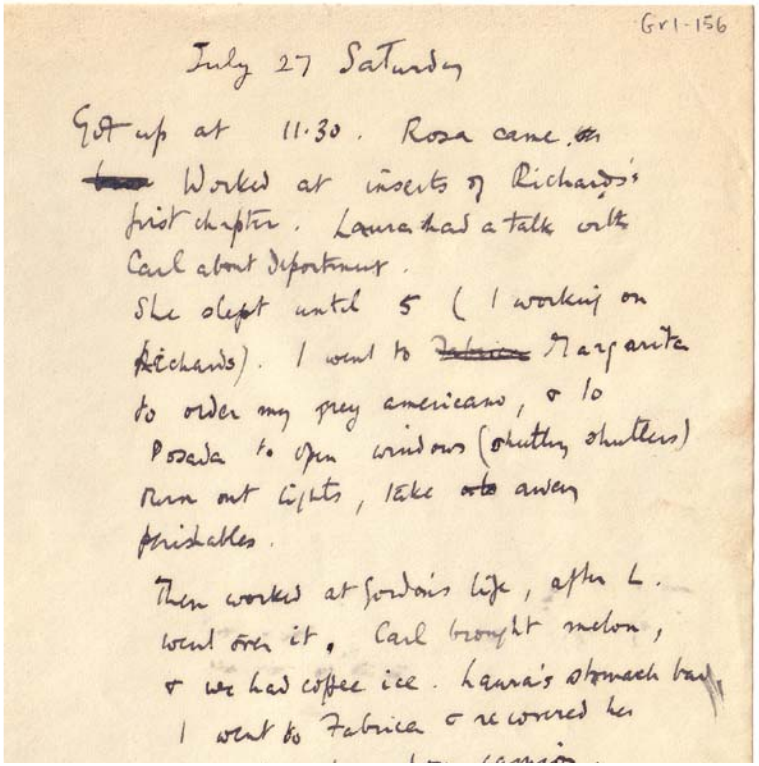
Good markup thus has to operate in all of these dimensions

A digital text may be ...

a ‘substitute’ (surrogate) simply representing the appearence of a document existant

Diary of Robert Graves 1935-39 and ancillary material

July 27 Saturday



Gr1-156

July 27 Saturday

Got up at 11.30. Rosa came. ~~at~~
~~[illegible]~~ Worked at inserts of Richards's first chapter. Laura had a talk with Carl about departure.
She slept until 5 (I working on Richards). I went to ~~Fabrica~~ Margarita to order my grey americano, & to Posada to open windows (shutting shutters) turn out lights, take ~~[illegible]~~ away perishables.
Then worked at Sordais life, after L. went over it. Carl brought melon, & we had coffee ice. Laura's stomach bad. I went to Fabrica & recovered her [illegible]

... or it may be

a representation of its linguistic content and structure, with additional annotations about its meaning and context.

Diary of Robert Graves 1935-39 and ancillary material

Copyright St John's College Robert Graves Trust

New Search | Diary Scans
« Return to Search Results

July 1935

« June | « Abstract » | August »

Sun	Mon	Tue	Wed	Thu	Fri	Sat
	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29	30	31			

Displayed Diary Scan(s)

July 27 Saturday
» Annotated markup
» Full-sized Image
» Gallery Scan

July 27 Saturday

Got up at 11.30. **Rosa** came.~~xxxxx~~[crossed out]

~~xxxxx~~[crossed out] Worked at inserts of **Richards**' first chapter. **Laura** had a talk with **Carl** about deportment.

She slept until 5 (I working on **Richards**[1]). I went to ~~Fábrica~~[RG] **Margarita** to order my grey *americano* [2], & to **Posada** to open windows (shutting shutters) turn out lights, take ~~into~~[RG] away perishables.

Then worked at **Gordon**'s Life[3], after **L.** went over it. **Carl** brought melon, & we had coffee ice. **Laura**'s stomach bad. I went to **Fábrica** & recovered her parasol & fan from *camión* [4]. More work on **Gordon**[5]. Bed at 12.

Gelat expects no result of law suit for two months. **Concordia** ceiling finished: tiles green & yellow, being laid diagonally.

Editorial Notes

[1] **Old Soldier Sahib**. eds.
[2] Spanish [slang?] for "jacket" KG; KG also replaces the final "o" with "a". eds.
[3] See **A Mistake Somewhere**. eds
[4] bus. KG
[5] i.e. Gordon's autobiography: see above. eds.

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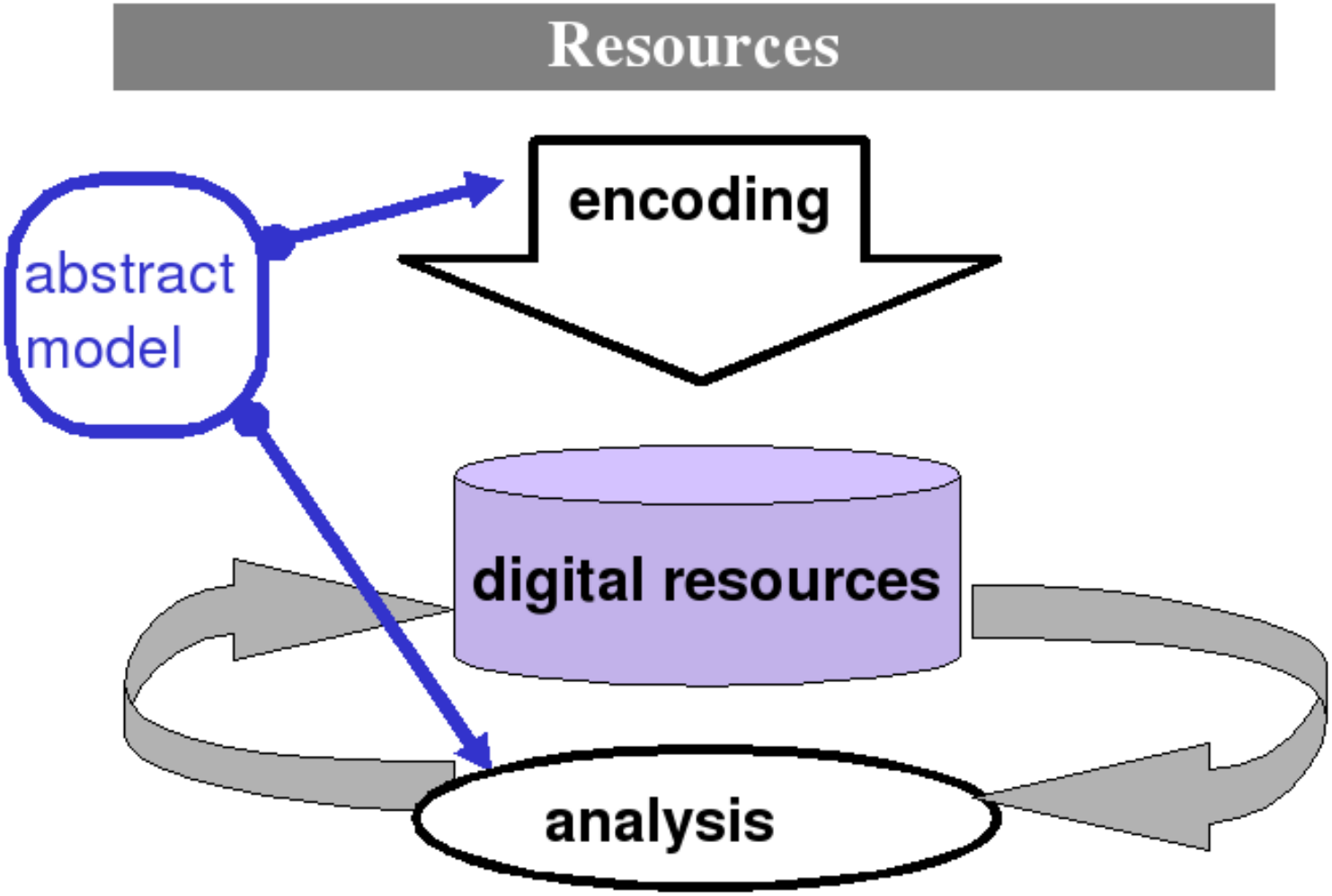
What do we do when we digitize?



Maybe the TEI can help ...

The TEI (of which more anon) provides a well established conceptual model of text able to support:

- conversion of existing data
- creation of new datasets
- integration of existing data sets derived from a variety of sources

It is an open and non proprietary format, based on open technologies

It also expresses an explicit theory about textual ontology

Are these images of the same thing?

A MONSEI-
GNEVR LE REVE-
rendiſſime Cardinal
du Bellay.
S.

VEV le Perſonnaige, que tu ioues au Spectacle de toute l'Europe, uoyre de tout le Monde en ce grand Theatre Romain, ueu tant d'affaires, & telz, que ſeul quaſi tu ſoutiens: ô l'Hõneur du ſacré College! pecheroy'-ie pas (comme dit le Pindare Latin) contre le bien publicq', ſi par longues paroles i'empeſchoy' le tens, que tu donnes au ſeruice de ton Prince, au profit de la Patrie, & à l'accroiſſement de ton immortelle renommée? Epiant donques quelque heure de ce peu de relaiz, que tu prens pour reſpirer ſoubz le peſant faiz des affaires Francoyſes (charge urayement digne de ſi robuſtes epaules, non moins que le Ciel de celles du grand Hercule) ma Muſe a pris la hardieſſe d'ẽtrer au ſacré Cabinet de tes ſainctes, & ſtudieuſes occupations: & la entre tant

a ij de

A MONSEIGNEUR

Le Reverendiſsime Cardinal du Bellay, S.

Veu le personnaige que tu joues au spectacle de toute l'Europe, voyre de tout le monde, en ce grand theatre romain; veu tant d'affaires et telz, que seul quasi tu soutiens : ô l'honneur du sacré College! pecheroy'-je pas (comme dit le Pindare latin) contre le bien publicq', si par longues paroles j'empeschoy' le tens que tu donnes au service de ton Prince, au profit de la patrie, et à l'accroissement de ton immortelle renommée? Epiant donques quelque heure de ce peu de relaiz, que tu prens pour respirer soubz le pesant faiz des affaires francoyses (charge vrayement digne de si robustes epaules, non moins que le ciel de celle du grand Hercule), ma Muse a pris la hardiesse d'entrer au sacré cabinet de tes saintes et studieuses oc-

How about these?

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Veu le personnaige que tu joues au spectacle de toute l'Europe, voyre de tout le monde, en ce grand theatre romain: veu tant d'affaires et telz, que seul

Joachim du Bellay

Défense et illustration de la langue françoyse (1549)

La Deffence, et Illustration de la Langue Francoyse

L'auteur prie les lecteurs différer leur jugement jusques à la fin du livre, et ne le condamner sans avoir premièrement bien vu, et examiné ses raisons.

Épître à Monseigneur le révérendissime cardinal du Bellay S.

Vu le personnage que tu joues au spectacle de toute l'Europe, voire de tout le monde, en ce grand Théâtre Romain, vu tant d'affaires, et tels que seul quasi tu soutiens, ô l'honneur du sacré Collège, pécherai-je pas (comme dit le Pindare Latin) contre le bien public, si par longues paroles j'empêchais le temps que tu donnes au service de ton prince, au profit de la patrie et à l'accroissement de ton immortelle renommée ? Épiant donc quelques heures de ce peu de relais que tu prends pour respirer sous le pesant faix des affaires françaises (charge vraiment digne de si robustes épaules, non moins que le ciel de celles du grand Hercule), ma Muse a pris la hardiesse d'entrer au sacré cabinet de tes saintes et studieuses occupations : et là, entre tant de riches et excellents voeux de jour en jour dédiés à l'image de ta grandeur, pendre le sien humble et petit, mais toutefois bien heureux s'il rencontre quelque faveur devant les yeux de ta bonté, semblable à celle des Dieux immortels, qui n'ont moins agréables les pauvres présents d'un bien riche vouloir que les superbes et ambitieuses offrandes.

A text is not a document

What is the essential part of a text?

- the shape of letters and their layout?
- the original from which this copy derives?
- the stories we read into it? its author's intentions?

A "document" is something that exists in the world, which we can digitize.

A "text" is an abstraction, created by or for a community of readers, which we can markup.

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Textual markup

- A text is more than a sequence of encoded glyphs or characters!
- A text is more than a sequence of linguistic forms!
  - It has a structure and a communicative function
  - It also has multiple possible readings
  - its meaning can be enriched by annotation
- Markup makes these things explicit
- Only that which is explicit can be reliably found and displayed, counted, analysed...

The Babel effect

Naturally, there are many possible readings of most texts ...

I

Loomings

Call me Ishmael. Some years ago – never mind how long precisely – having little or no money in my purse, and nothing particular to interest me on shore, I thought I would sail about a little and see the watery part of the world. It is a way I have of driving off the

... and (alas) many different ways of expressing each reading!

Encodings

```
|chap1
<C 1> Loomings
\chapter[1]{Loomings}
:h1.1.  Loomings
MOBY001001LOOMINGS
|C1
.chapter Loomings
.cp;.sp 6 a;.ce .bd 1. Loomings
<h1>Loomings</h1>
<p class="h1">Loomings
~x
```

- Good news: there is software capable of converting amongst hundreds of different formats
- Bad news: we still need it

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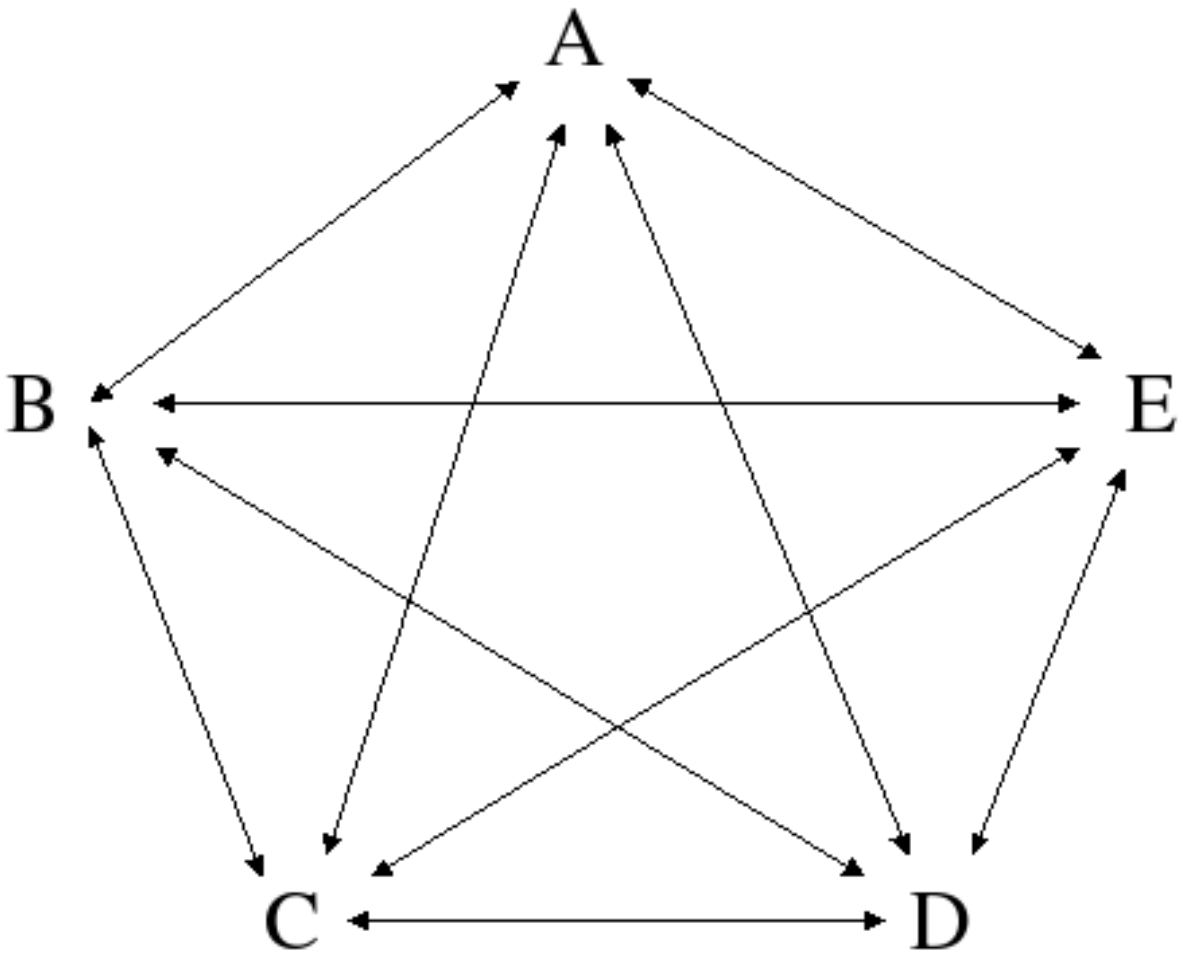
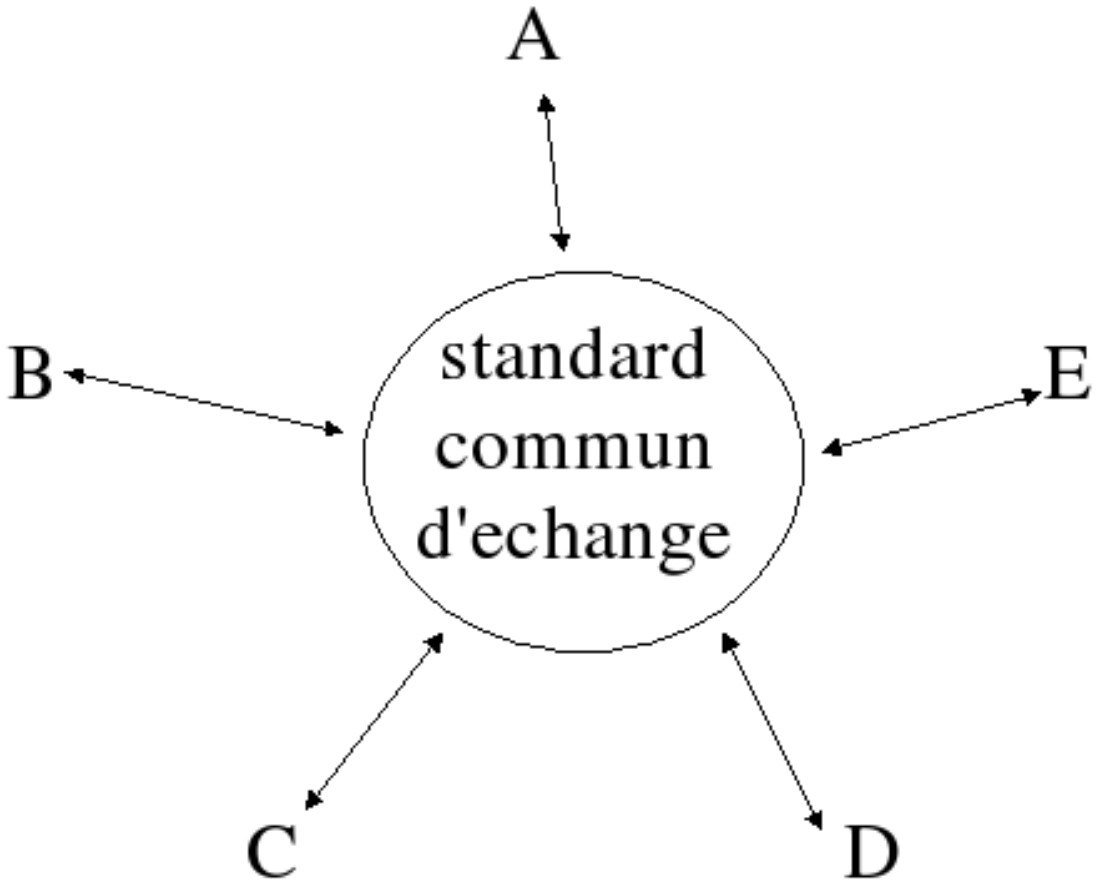
Information exchange (1)



without a standard interchange format: 20 translations are needed
or 5 formats (n*n-n)

Information exchange (2)



with a standard interchange format: 10 translations are needed for 5 formats (n*2)

What's the markup for?

- To make explicit (to a machine) what is implicit (to a person)
- To add value by supplying multiple annotations
- To facilitate re-use of the same material
  - in different formats
  - in different contexts
  - by different users

  we don't have to be limited to the view of one editor or consumer

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Styles of markup

- In the beginning there was procedural markup
  `RED INK ON; print balance; RED INK OFF`
- which naturally led to thinking of markup as primarily presentational
  `<redInk>some numbers</redInk>`
- but maybe descriptive markup is preferable>?
  `<balance type='overdrawn'>some numbers</balance>`
- also known as encoding or annotation

Isn't it more useful to markup what we think things are than what they look like?

Markup is a scholarly activity

- The application of markup to a document is not an automatic process
- In deciding what markup to apply, and how this represents the original, one is undertaking the task of an editor
- There is (almost) no such thing as neutral markup -- all of it involves interpretation
- Markup can assist in answering research questions, and the deciding what markup is needed to enable such questions to be answered can be a research activity in itself
- Good textual encoding is never as easy or quick as people would believe
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Separation of form and content

- Presentational markup cares more about fonts and layout than meaning
- Descriptive markup says what things are, and leaves the rendition of them for a separate step
- Separating the form of something from its content makes it much easier to re-use
- It also allows easy changes of presentation across a large number of documents

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What then shall we markup?

Compare ...

```
<pb n="4"/>A MONSEI- <lb/>GNEUR LE REVE-
<lb/>rendissime Cardinal <lb/>du Bellay. <lb/>S
<lb/>
<c rend="lettrine">V</c>EU le
Personnaige, <lb/>que tu joues au Spec- <lb/>tacle de toute
l'Europe...
```

```
<div type="dedicace">
 <head>A MONSEIGNEUR LE REVERENDISSIME CARDINAL DU
BELLAY</head>
 <salute>S<ex>ire</ex>
 </salute>
 <p>
  <c rend="lettrine">V</c>EU le Personnaige, que tu joues
au Spectacle de toute
   l'Europe... </p>...
</div>
```

... and

```
<pb n="4"/>
<s>
 <w pos="PPJ" lemma="voir">VEU</w>
 <w pos="ART" lemma="le">le</w>
 <w pos="SBC" lemma="personnage">Personnaige</w>
 <pc>,</pc>
 <w pos="COO" lemma="que">que</w> ...
</s>
```

or even

```
<s>
 <choice>
  <reg>Vu</reg>
  <orig>Veu</orig>
 </choice> le
<choice>
  <reg>Personnage</reg>
  <orig>Personnaige</orig>
 </choice>, que tu joues au
Spectacle...
</s>
```

Compare the markup

```
<hi rend="dropcap">H</hi>&WYN;ÆT WE
GARDE <lb/>na in gear-dagum þeod-cyninga <lb/>þrym gefrunon,
hu ða æþelingas <lb/>ellen
fremedon. oft scyld scefing sceaþe
<add>na</add>
<lb/>þreatum, moneg<expan>um</expan> mægþum meodo-setl
<add>a</add>
<lb/>of<damage>
 <desc>blot</desc>
</damage>teah ...
```

```
<lg>
 <l>Hwæt! we Gar-dena in gear-dagum</l>
 <l>þeod-cyninga þrym gefrunon,</l>
 <l>hu ða æþelingas ellen fremedon,</l>
</lg>
<lg>
 <l>Oft Scyld Scefing sceaþena þreatum,</l>
 <l>monegum mægþum meodo-setla ofteah;</l>
 <l>egsode Eorle, syððan ærest wearþ</l>
 <l>feasceaft funden...</l>
</lg>
```

The markup language we use must be able to ...

- specify all the characters found
- make explicit the structures perceived
- represent that structure in a linear processable form
- additionally supply a variety of metadata or annotations

XML is a good fit... mostly

Some alphabet soup

SGML	Standard Generalized Markup Language
HTML	Hypertext Markup Language
W3C	World Wide Web Consortium
XML	eXtensible Markup Language
DTD	Document Type Definition (or Declaration)
CSS	Cascading Style Sheet
Xpath	XML Path Language
XSLT	eXtensible Stylesheet Language - Transformations
XQuery	XML Querying
RELAXNG	Regular Expression Language for XML (New Generation)

Oh, and then there's also TEI, the Text Encoding Initiative

XML: what it is and why you should care

- XML is structured data represented as strings of text
- XML looks like HTML, except that:-
  - XML is extensible
  - XML must be well-formed
  - XML can be validated
- XML is application-, platform-, and vendor- independent
- XML empowers the content provider and facilitates data integration

Nearly all there is to know about XML, on one slide

- An XML document contains at least one element
- An element is represented by a start-tag, some optional content, and an end-tag
- The content of an element can be a string of Unicode characters, or one or more other elements
- An element may also have attributes, each consisting of a name and a value
- An XML document may also contain processing instructions comments or entity references

An XML document must be well-formed and may be valid

For example

```
<?xml version="1.0" ?><root>
 <element attribute="value"> content
 </element>
<!-- comment -->
</root>
```

Parts of an XML document

```
<?xml version="1.0"?><greetings
xmlns="http://www.example.org/greetings">
 <hello type="sarcastic">hello
   world!</hello>
</greetings>
```

- The XML declaration
- Namespace declarations
- The root element of the document itself
- Other elements and content
- Attribute and value

The rules of the XML Game

- An XML document represents a (kind of) tree
- It has a single root and many nodes
- Each node can be
  - a subtree
  - a single element (possibly bearing some attributes)
  - a string of character data
- Each element has a name or generic identifier
- XML elements and attributes are case sensitive

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Representing an XML tree

- An XML document is encoded as a linear string of characters
- It begins with a special processing instruction
- Element occurrences are marked by start- and end-tags
- The characters < and & are Magic and must always be "escaped" if you want to use them as themselves
- Comments are delimited by <!-- and -->
- Attribute name=value pairs are supplied on the start-tag and may be given in any order, separated by spaces
- Entity references (eg < for < or Ç for Ç) are delimited by & and ;
- CDATA sections are delimited by <![CDATA[and]]> (but you probably don't need these)

The XML declaration

An XML document must begin with an XML declaration which does three things:

- specifies that this is an XML document
- specifies which version of the XML standard it follows
- specifies which character encoding the document uses

```
<?xml version="1.0" ?>
<?xml version="1.0" encoding="iso-8859-1" ?>
```

The default, and recommended, encoding is 'UTF-8' (Unicode)

Namespaces

- A namespace is a label, declared with URL syntax, used to identify a group of XML element names and distinguish them from others.
- An XML document can include elements from many different namespaces. All TEI documents show that by default their component elements belong to the TEI namespace by beginning with the following declaration:
  ```
  <TEI xmlns="http://www.tei-c.org/ns/1.0">
  ... </TEI>
  ```
- The xml namespace is also used by the TEI for global attributes @xml:id and @xml:lang
- Other namespaces can appear in a TEI document: for example, MathML:

```
 <TEI xmlns="http://www.tei-
c.org/ns/1.0" xmlns:math="http://www.mathml.org">
                <p>...<math:expr>...</math:expr>...</p>...</TEI>
```

XML syntax: the small print

What does it mean to be well-formed?

1. There is a single root node containing the whole of an XML document
2. Each subtree is properly nested within the root node
3. Element/attribute/etc. names are always case sensitive
4. Start-tags and end-tags are always mandatory (except there is a combined start-and-end tag `<pb/>`)
5. Attribute values are always quoted

Note: You can be valid in addition to being well-formed. This means you obey the rules of a specified schema, such as the TEI.

Test your XML knowledge

- Which are correct?
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XML is an international standard

- XML requires use of ISO 10646 (also known as Unicode)
  - a 31 bit character repertoire including most human writing systems
  - encoded as UTF8 or UTF16
- other encodings may be specified at the document level
- language may be specified at the element level using @xml:lang to supply values taken from another ISO standard (ISO 639)

Characters or glyphs not defined in Unicode must therefore be represented using markup

XML validation

A valid XML document is well formed, and also conforms to some additional structural rules, which make up what we call a schema.

A schema allows you to specify:

- which elements can appear as the root element of a document
- which elements and attributes can appear where
- names, datatypes, and default values for all attributes

A schema thus allows you to check that 'every chapter must begin with a heading' or 'recipes must include an ingredient list' or 'values for the attribute @when are all valid dates'

A namespace by contrast just allows you to label elements as being somehow related. A schema provides a formal specification and is written in a formal language.

Schema languages

A schema can be expressed using:

- DTD: an older ISO standard
- RNG: ISO standard RELAXNG
- WSD: the W3C Schema language

All have different tool kits, different syntaxes, and different methods of doing things, particularly for content validation.

The TEI uses RELAXNG