RDFa Syntax

A collection of attributes for layering RDF on XML languages

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The English version of this specification is the only normative version. Non-normative translations may also be available.

Abstract

Current web pages, written in HTML, contain significant inherent structured data. When publishers can express this data more completely, and when tools can read it, a new world of user functionality becomes available, letting users transfer structured data between applications and web sites. An event on a web page can be directly imported into a user's desktop calendar; a license on a document can be detected so that users can be informed of their rights automatically; a photo's creator, camera setting information, resolution, and topic can be published as easily as the original photo itself, enabling structured search and sharing.

RDFa is a syntax for expressing this structured data in XHTML. The rendered, hypertext data of XHTML is reused by the RDFa markup, so that publishers don't repeat themselves. The underlying abstract representation is RDF, which lets publishers build their own vocabulary, extend others, and evolve their vocabulary with maximal interoperability over time. The expressed structure is closely tied to the data, so that rendered data can be copied and pasted along with its relevant structure.

The rules for interpreting the data are generic, so that there do not have to be different rules for different structures; this allows authors and publishers of data to define their own formats without having to update software, or register formats via a central authority.

This document is a detailed syntax specification for RDFa. For a more gentle introduction, please consult the RDFa Primer.

Status of this Document

This section describes the status of this document at the time of its publication. Other documents may supersede this document. A list of current W3C publications and the latest revision of this technical report can be found in the W3C technical reports index at http://www.w3.org/TR/.

This is an internal draft produced by the Semantic Web Deployment Working Group [SWD-WG] [p.34] , in cooperation with the XHTML 2 Working Group [XHTML2-WG] [p.34] . Initial work on RDFa began with the Semantic Web Best Practices and Deployment Working Group [SWBPD-WG] [p.34] .

At this time, the prose of the document is not complete and is not *quite* consistent with the current agreements the task force has with regard to processing model, etc. The section on Processing Model [p.19] is up-to-date; if there is a discrepancy between the prose and that section, that section is most likely correct.

This document has no official standing within the W3C. It is also a work in progress, which means it may change at any time, without warning, and you shouldn't rely on anything in this document.

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1. Motivation

RDF/XML [RDF-SYNTAX] [p.33] provides sufficient flexibility to represent all of the abstract concepts in RDF [RDF-CONCEPTS] [p.33] . However, it presents two challenges; first it is difficult or impossible to validate documents that contain RDF/XML using XML Schemas or DTD's, which makes it difficult to import RDF/XML into other markup languages. Whilst newer schema languages such as RELAX NG [RELAXNG] [p.34] do provide a way to validate documents that contain arbitrary RDF/XML, it will be a while before they gain wide support.

Second, even if one could add RDF/XML directly into an XML dialect like XHTML, there would be significant data duplication between the rendered data and the RDF/XML structured data. It would be far better to add RDF to a document without repeating the document's existing data. For example, an XHTML document that explicitly renders its author's name "Mark Birbeck" should not need to repeat this name for the RDF expression of the same concept: it should be possible to supplement the existing markup in such a way that it can also be interpreted as RDF, with minimal repetition of data.

Third, as users often want to transfer structured data from one application to another, sometimes to or from a non-web-based application, it is highly beneficial to express the web data's structure "in context." The user experience could then be enhanced, for example by providing contextual information about specific rendered data, perhaps when the user "right-clicks" on an item of interest.

In the past, many attributes were 'hard-wired' directly into the markup language to represent specific concepts. For example, in XHTML 1.1 [XHTML11 [p.33]] and HTML [HTML4 [p.33]] there is a `cite` attribute; the attribute allows an author to add information to a document which is used to indicate the origin of a quote.

However, these 'hard-wired' attributes make it difficult to define a generic process for extracting metadata from any document since a parser would need to know about each of the special attributes. One motivation for RDFa then, has been to devise a means by which documents can be augmented with metadata in a generic rather than hard-wired manner. This has been achieved by creating a fixed set of attributes and parsing rules, but allowing those attibutes to contain properties from any of a number of the growing range of available taxonomies. The *values* of those properties are in most cases the information that is already in an author's document.

RDFa takes the pressure off language authors to anticipate all the structural requirements users of their language might have, by outlining a new syntax for RDF that relies only on attributes. RDFa can be easily imported into other XML-based markup languages, as well as HTML, allowing any mark-up language to carry arbitrary RDF.

This specification deals specifically with the use of RDFa in HTML-based languages, such as HTML and XHTML.

2. Terms and Abbreviations

2.1. Namespaces

In the following examples, for brevity assume that the following namespace prefixes are defined:

cc:	http://creativecommons.org/ns#
dc:	http://purl.org/dc/elements/1.1/
ex:	http://example.org/
foaf:	http://xmlns.com/foaf/0.1/
rdf:	http://www.w3.org/1999/02/22-rdf-syntax-ns#
rdfs:	http://www.w3.org/2000/01/rdf-schema#
svg:	http://www.w3.org/2000/svg
xh11:	http://www.w3.org/1999/xhtml
xsd:	http://www.w3.org/2001/XMLSchema#
biblio:	http://example.org/biblio/0.1
taxo:	http://purl.org/rss/1.0/modules/taxonomy/

2.2. RDF Terminology

2.2.1. Statements

The metadata information that RDFa provides access to is generally understood to be a collection of *statements*. A statement is a basic unit of information that has been constructed in a very specific way to make it easier to process. In turn, by breaking large sets of information down into a collection of statements, even very complex metadata can be made available for processing.

To illustrate, suppose we have the following set of facts:

```
Albert was born on March 14, 1879, in Germany. There is a picture of him at http://en.wikipedia.org/wiki/Image:Albert_Einstein_Head.jpg.
```

This would be quite difficult for a machine to process, and it is certainly not in a format that could be passed from one system to another. However, if we convert the information to a set of statements it begins to be more manageable. The same information could therefore be represented as follows:

```
Albert was born on March 14, 1879.
Albert was born in Germany.
Albert has a picture at http://en.wikipedia.org/wiki/Image:Albert_Einstein_Head.jpg.
```

2.2.2. Triples

To make this information machine-processable RDF defines the structure of these statements very tightly. A statement is actually a *triple*, meaning that it is made up three components. The first is the *subject* of the statement, and is what we are making our statements about. In these examples the subject is always 'Albert'.

The second part of a triple is the property of the subject that we want to define. In the examples here, the properties would be 'was born on', 'was born in', and 'has a picture at'. These are more usually called *predicates* in RDF.

The final part of a triple is the value of the property, or the *object*. In the examples here the object values are 'March 14, 1879', 'Germany', and 'http://en.wikipedia.org/wiki/Image:Albert_Einstein_Head.jpg'.

2.2.3. URI references

Breaking complex information into manageable units obviously helps, but there is still ambiguity here. For example, which 'Albert' are we talking about? If some system has further facts--triples--about 'Albert' how could we know whether they are about the same person, and so add them to the list of things we know about that person? Also, if we wanted to find people born in Germany, how could we know that the predicate 'was born in' has the same purpose as the predicate 'birthplace' that exists in some other system? RDF solves this problem by replacing our vague terms with *URI references*.

URIs are most commonly used to identify web pages, but RDF makes use of them as a way to provide unique identifiers for concepts. For example, we could identify the subject of all of our statements by using the DBPedia URI for Albert Einstein:

```
<http://dbpedia.org/resource/Albert_Einstein> has the name Albert Einstein.
<http://dbpedia.org/resource/Albert_Einstein> was born on March 14, 1879.
<http://dbpedia.org/resource/Albert_Einstein> was born in Germany.
<http://dbpedia.org/resource/Albert_Einstein> has a picture at http://en.wikipedia.org/wiki/Image:Albert_Einstein_Head.jpg.
```

URI references are also used to uniquely identify the objects in metadata statements (note that the picture of Einstein is already a URI):

```
<http://dbpedia.org/resource/Albert_Einstein> has the name Albert Einstein.
<http://dbpedia.org/resource/Albert_Einstein> was born on March 14, 1879.
<http://dbpedia.org/resource/Albert_Einstein> was born in <http://dbpedia.org/resource/Germany>.
<http://dbpedia.org/resource/Albert_Einstein> has a picture at <http://en.wikipedia.org/wiki/Image:Albert_Einstein_Head.jpg>.
```

And of course URI references are also used to ensure that predicates are unambiguous:

```
<http://dbpedia.org/resource/Albert_Einstein>
  <http://xmlns.com/foaf/0.1/name> Albert Einstein.
<http://dbpedia.org/resource/Albert_Einstein>
  <http://dbpedia.org/property/dateOfBirth> March 14, 1879.
<http://dbpedia.org/resource/Albert_Einstein>
  <http://dbpedia.org/property/birthPlace> <http://dbpedia.org/resource/Germany>.
<http://dbpedia.org/resource/Albert_Einstein>
  <http://xmlns.com/foaf/0.1/depiction> <http://en.wikipedia.org/wiki/Image:Albert_Einstein_Head.jpg>.
```

2.2.4. Plain literals

Although URI resources are always used for subjects and predicates, the object part of a triple can be either a URI or a *literal*. In the example triples, Einstein's name is represented by a *plain literal*, which means that it is a basic string with no type or language information:

```
<http://dbpedia.org/resource/Albert_Einstein>
  <http://xmlns.com/foaf/0.1/name> "Albert Einstein".
```

2.2.5. Typed literals

Some literals, such as dates and numbers, have very specific meanings, so RDF provides a mechanism for indicating the type of a literal. A *typed literal* is indicated by attaching a URI to the end of a plain literal which indicates the literal's datatype. This URI is usually based on datatypes defined in the XML Schema Datatypes specification [XML SCHEMA DATATYPES REFERENCE / http://www.w3.org/TR/xmlschema-2/]. The following syntax would be used to unambiguously express Einstein's date of birth as a literal of type `xsd:date`:

```
<http://dbpedia.org/resource/Albert_Einstein>
  <http://dbpedia.org/property/dateOfBirth> "1879-03-14"^^<http://www.w3.org/2001/XMLSchema#date>.
```

2.2.6. N-Triples

RDF does not have one set way to express triples, since the key ideas of RDF are the triple and the use of URIs. However, a number of mechanisms are available, such as RDF/XML, N-Triples [N-TRIPLES] [p.33] , and of course RDFa. Most discussions of RDF make use of the *N-Triple* syntax to explain their ideas, since it's quite compact. The examples we have just seen are already using this syntax, and we'll continue to use it throughout this document, with a slight variation that long URIs can be abbreviated by using a URI mapping. This is indicated by removing the angle brackets from the URI, as follows:

```
<http://dbpedia.org/resource/Albert_Einstein>
  foaf:name "Albert Einstein" .
<http://dbpedia.org/resource/Albert_Einstein>
  p:dateOfBirth "1879-03-14"^^xs:date .
<http://dbpedia.org/resource/Albert_Einstein>
  p:birthPlace <http://dbpedia.org/resource/Germany>.
<http://dbpedia.org/resource/Albert_Einstein>
  foaf:depiction <http://en.wikipedia.org/wiki/Image:Albert_Einstein_Head.jpg>.
```

Note that this is merely a way to make examples more compact and the actual triples generated would use the full URIs.

When writing examples, you will often see the following URI:

<>

This indicates the 'current document', i.e., the document being processed.

2.2.7. Graphs

A collection of triples is called a *graph*.

For more information on the concepts described above, see [RDF-CONCEPTS] [p.33] .

2.2.8. Description of RDFa in RDF terms

The following is a description of RDFa that uses RDF terminology:

The aim of RDFa is to allow [RDF graph]s to be carried in XML documents of any type. An [RDF graph] comprises [node]s linked by relationships. The basic unit of a graph is a [triple], in which a subject [node] is linked to an object [node] via a [predicate]. The subject [node] is always either an [RDF URI reference] or a [blank node], the predicate is *always* an [RDF URI reference], and the object of a statement can be an [RDF URI reference], a [literal], or a [blank node].

In RDFa, a subject [RDF URI reference] is indicated using the attribute `about` and predicates are represented using one of the attributes `property`, `instanceof`, `rel`, or `rev`. Objects which are [RDF URI reference]s are represented using the attributes `href`, `resource` or `src`, whilst objects that are [literal]s are represented either with the attribute `content` (with an optional [datatype] expressed using the `datatype` attribute), or the content of the element in question.

2.3. Using `xml:base`

All [RDF URI references] are subject to `xml:base` [XMLBASE] [p.33] . Note that this means that in the absence of an `xml:base` attribute, the document containing the RDF statements is *itself* the base.

An example follows to show how `xml:base` affects the subject:

```
<span xml:base="http://internet-apps.blogspot.com/">
    <link about="" rel="dc:creator" href="http://www.blogger.com/profile/1109404" />
    <meta about="" property="dc:title" content="Internet Applications" />
</span>
```

The triples generated would be as follows:

```
<http://internet-apps.blogspot.com/>
   dc:creator <http://www.blogger.com/profile/1109404> .
<http://internet-apps.blogspot.com/>
   dc:title "Internet Applications" .
```

2.4. Compact URIs

In order to allow for the compact expression of RDF statements, RDFa uses a superset of QNames [QName] that allows the contraction of all URIs (QNames have a syntactic restriction on the sorts of URI that can be contracted).

These Compact URIs are called CURIEs here.

The `rel`, `rev`, and `property` attributes accept CURIE-only datatypes, while `href` and `about` accept mixed CURIE [p.11] data. In particular, the following notation is a valid RDFa statement:

```
This document is licensed under a
<a xmlns:cclicenses="http://creativecommons.org/licenses/"
   rel="cc:license"
   href="http://creativecommons.org/licenses/by/nc-nd/3.0/">
  Creative Commons License
</a>.
```

which generates the following triple, as expected:

```
<>
   cc:license <http://creativecommons.org/licenses/by/nc-nd/3.0/> .
```

2.4.1. CURIE Syntax Definition

Note that this syntax definition will ultimately be defined in an external document [CURIE [p.??]].

A basic CURIE is comprised of two components, a *prefix* and a *reference*. The prefix is separated from the reference by a colon (`:`).

```
curie       :=   [ prefix [ ':' ] ] reference

prefix      :=   NCName

reference   :=   irelative-ref (as defined in [IRI])
```

The prefix value MUST be defined using the 'xmlns:' syntax specified in [XMLNAMES [p.??]].

If the prefix is omitted from a CURIE, the default value of http://www.w3.org/1999/xhtml MUST be used.

A CURIE is a representation of a full IRI. This IRI is obtained by concatenating the IRI associated with the `prefix` with the `reference`. The result MUST be a syntactically valid IRI [IRI [p.33]].

The CURIE prefix '_' is reserved. For this reason, prefix declarations using '_' SHOULD be avoided by authors.

Host languages MAY define additional constraints on these syntax rules when CURIES are used in the context of those host languages. Host languages MUST NOT relax the CURIE syntax constraints defined in this specification.

3. Introduction to the structure of RDFa

3.1. Overview

The main idea behind the syntax for RDFa is that existing data should be easy to update to convey RDF triples. Thus, the bulk of RDFa can be expressed using only attributes applied to existing elements within the XML document. These are

`about`,
: a curie [p.11] , used for stating what the data is about (the 'subject' in RDF terminology)

`rel`,
: a whitespace separated list of curie [p.11] s, used for expressing relationships between two resources (a 'predicate' in RDF)

`rev`,
: a whitespace separated list of curie [p.11] s, used for expressing reverse relationships between two resources (also a 'predicate')

`property`,
: a whitespace separated list of curie [p.11] s, used for expressing relationships between the subject and some literal text (also a 'predicate')

`href`,
: a URI for expressing the partner resource of a relationship (the 'object' in RDF)

`resource`,
: a URI for expressing the partner resource of a relationship that is not intended to be 'clickable' (also an 'object')

`src`,
: a URI for expressing the partner resource of a relationship when the resource is embedded (also an 'object')

`datatype`,
: a schema datatype, to express the datatype of a literal

`content`
: a string, for supplying alternative, machine-readable content for a literal.

`instanceof`
: a whitespace separated list of curie [p.11] s that indicate the RDF type(s) to associate with the subject.

Several of these attributes alredy exist in HTML, and their general HTML use is preserved. This specification simply gives an RDF interpretation to their existing use.

For example, given an XHTML chunk as follows:

```
This photo was taken by
<span class="author">Mark Birbeck</span>.
```

a simple attribute augmentation can yield an RDF triple:

```
This photo was taken by
<span class="author" about="photo1.jpg" property="dc:creator">Mark Birbeck</span>.
```

which yields:

```
<photo1.jpg>
   dc:creator "Mark Birbeck" .
```

Similarly, links can be augmented to express RDF triples. Consider an XHTML chunk:

```
This photo was taken by
<a href="http://www.blogger.com/profile/1109404">Mark Birbeck</a>.
```

When the RDF object is a URI, the RDF predicate is designated using `rel`:

```
This photo was taken by
<a about="photo1.jpg" rel="dc:creator"
   href="http://www.blogger.com/profile/1109404">Mark Birbeck</a>.
```

which yields:

```
<photo1.jpg>
   dc:creator <http://www.blogger.com/profile/1109404> .
```

It's important to note that the various RDFa attributes can be used on any existing element of the host language. Note also that one can express a reverse relationship using the `rev` attribute. For example, if the photo in question is actually a depiction of Mark, one could write:

```
This photo was taken by
<a about="photo1.jpg" rev="foaf:img"
   href="http://www.blogger.com/profile/1109404">Mark Birbeck</a>.
```

which would yield:

```
<http://www.blogger.com/profile/1109404>
   foaf:img <photo1.jpg> .
```

Both relations can be expressed simultaneously:

```
This photo was taken by
<a about="photo1.jpg" rel="dc:creator" rev="foaf:img"
   href="http://www.blogger.com/profile/1109404">Mark Birbeck</a>.
```

which then yields two triples:

```
<photo1.jpg>
   dc:creator <http://www.blogger.com/profile/1109404> .
<http://www.blogger.com/profile/1109404>
   foaf:img <photo1.jpg> .
```

It's possible to go further and add the attributes used for denoting statements in which the object is a [literal]:

```
This photo was taken by
<a about="photo1.jpg" property="dc:title"
   rel="dc:creator"
   rev="foaf:img" href="http://www.blogger.com/profile/1109404">Mark Birbeck</a>.
```

which would then yield:

```
<photo1.jpg>
   dc:creator <http://www.blogger.com/profile/1109404> .
<http://www.blogger.com/profile/1109404>
   foaf:img <photo1.jpg> .
<photo1.jpg>
   dc:title "Mark Birbeck" .
```

Or going further:

```
This photo was taken by
<a about="photo1.jpg" property="dc:title"
   content="Portrait of Mark"rel="dc:creator"
   rev="foaf:img" href="http://www.blogger.com/profile/1109404">Mark Birbeck</a>.
```

which would then yield:

```
<photo1.jpg>
   dc:creator <http://www.blogger.com/profile/1109404> .
<http://www.blogger.com/profile/1109404>
   foaf:img <photo1.jpg> .
<photo1.jpg>
   dc:title "Portrait of Mark" .
```

It's possible to do all of this without ambiguity, since the `property` attribute always denotes a predicate in a statement using a [literal] as the object, whilst the `rel` and `rev` attributes always denote a predicate in a statement using a [URI reference] as the object.

Of course, the more natural way to express the three above triples is to strive to make all metadata literals and URIs meaningful within the host language. Specifically, in the case of XHTML, it makes sense to render as much of the useful metadata as possible and use RDFa to mark up this rendered data. The following XHTML thus generates the same triples as shown above.

```
This photo, entitled
<span about="photo1.jpg" property="dc:title">Portrait of Mark</span>
was taken by
<a about="photo1.jpg" rel="dc:creator" rev="foaf:img"
   href="http://www.blogger.com/profile/1109404">Mark himself</a>.
```

The value of the `about` attribute sets the subject for any nested triples which means that the same triples can be expressed using this, more compact, syntax:

```
<div about="photo1.jpg">
  This photo, entitled
  <span property="dc:title">Portrait of Mark</span>
  was taken by
  <a rel="dc:creator" rev="foaf:img"
     href="http://www.blogger.com/profile/1109404">Mark himself</a>.
</div>
```

3.2. Qualifying document components

A second feature of RDFa is that it is possible to use parts of the host document to provide the [subject] of a [triple]. This marks RDFa from other approaches to serialising RDF, in that the the same syntax can now be used to make statements about parts of a document, and external documents.

It is possible to make such statements using the syntax introduced in the examples above:

```
<html xmlns:dc="http://purl.org/dc/elements/1.1/">
    <head>
        <title>On Crime and Punishment</title>
    </head>
    <body>
        <blockquote id="q1" about="#q1" rel="dc:source" resource="urn:isbn:0140449132" >
            <p>
                Rodion Romanovitch! My dear friend! If you go on in this way
                you will go mad, I am positive! Drink, pray, if only a few drops!
            </p>
        </blockquote>
    </body>
</html>
```

3.3. Relating document components

Using qualifying statements, RDFa allows a single XML dialect document to include multiple RDF entities. Relations between the various entities of a given page can also be defined using RDFa notation.

Consider the following XHTML, which defines two RDF entities of type `taxo:topic`, two RDF entities of type `biblio:Publication`, metadata pertinent to each publication, including `dc:title` and `dc:creator`, and relations of type `taxo:topics` between the publications and tags:

```
<html xmlns:dc="http://purl.org/dc/elements/1.1/">
    <head>
        <title>Mark's Publications</title>
    </head>
    <body>

       <h2>Tags</h2>
       <div id="tag_standards">
          <link rel="rdf:type" href="[taxo:topic]" />
          Standards
```

```
        </div>
        <div id="tag_xforms">
           <link rel="rdf:type" href="[taxo:topic]" />
           XForms
        </div>

        <h2>Publications</h2>
        <div id="publication_1">
          <link rel="rdf:type" href="[biblio:Publication]" />
          <link rel="dc:creator" href="http://www.blogger.com/profile/1109404" />
          <meta property="dc:title">A Standards-Based Virtual Machine</meta>
          <link rel="taxo:topics" href="#tag_standards" />
        </div>
        <div id="publication_2">
          <link rel="rdf:type" href="[biblio:Publication]" />
          <link rel="dc:creator" href="http://www.blogger.com/profile/1109404" />
          <meta property="dc:title">XForms and Internet Applications</meta>
          <link rel="taxo:topics" href="#tag_standards" />
          <link rel="taxo:topics" href="#tag_xforms" />
        </div>
     </body>
</html>
```

This yields the expected triples:

```
<#tag_standards>
   rdf:type taxo:topic .
<#tag_xforms>
   rdf:type taxo:topic .

<#publication_1>
   rdf:type biblio:Publication .
<#publication_1>
   dc:creator <http://www.blogger.com/profile/1109404>
<#publication_1>
   dc:title "A Standards-Based Virtual Machine"^^rdf:XMLLiteral .
<#publication_1>
   taxo:topics <#tag_standards> .

<#publication_2>
   rdf:type biblio:Publication .
<#publication_2>
   dc:creator <http://www.blogger.com/profile/1109404> .
<#publication_2>
   dc:title "XForms and Internet Applications"^^rdf:XMLLiteral .
<#publication_2>
   taxo:topics <#tag_standards> .
<#publication_2>
   taxo:topics <#tag_xforms> .
```

Beyond this theoretical example, this application of RDFa is particularly useful for formats like FOAF. (See examples.)

3.4. Global RDF statements

The previous series of examples may mislead one to think that RDFa statements are only contextual, only meant to qualify existing elements. However, as the first examples implied, a fixed `about` attribute can be used to specify a global subject. It is actually quite easy to make independent, global RDF statements. Statements like:

```
This document is licensed under a
<a about="" rel="cc:license"
   href="http://creativecommons.org/licenses/by-nc-nd/3.0/">
  Creative Commons
</a>.
```

will produce the same triple no matter where they're located in the document:

```
<>
   cc:license <http://creativecommons.org/licenses/by-nc-nd/3.0/> .
```

4. Processing Model

This section is normative.

This section looks at a generic set of processing rules for creating a set of triples that represent the metadata present in an XHTML+RDFa document. Processing need not follow the DOM traversal technique outlined here, although the effect of following some other manner of processing must be the same as if the processing outlined here were followed. The processing model is explained using the idea of DOM traversal which makes it easier to describe (particularly in relation to the 'evaluation context').

4.1. Overview

Parsing a document for RDFa triples is carried out by starting at the root element of the document, and visiting each of its child elements in turn, applying processing rules. Processing is recursive in that for each child element the processor also visits each of *its* child elements, and applies the same processing rules.

As processing continues, various rules are applied which will either generate triples, or change the [evaluation context] information which will be used in subsequent processing. Some of the rules will be determined by the host language--in this case XHTML--and some of the rules will be part of RDFa.

Note that we don't say anything about what should happen to the triples generated, or whether more triples might be generated during processing than are outlined here. However, to be conformant, an RDFa processor needs to act as if at least the rules in this section are applied.

4.2. Evaluation Context

During processing, each rule is applied within an 'evaluation context'. Rules may further modify this evaluation context, or create triples that can be established by making use of this evaluation context. The context itself consists of the following pieces of information:

- The [base]. This will usually be the URL of the document being proessed, but it could be some other URL, set by some other mechanism, such as the HTML `base` element. The important thing is that it establishes a URL against which relative paths can be evaluated.
- The [current resource]. The initial value will be the same as the initial value of `base`, but it will usually change during the course of processing.
- A list of current in-scope [URI mappings].
- The [language]. Note that there is no default language.

4.3. Processing

Processing would normally begin after the document to be parsed has been completely loaded. However, there is no requirement for this to be the case, and it is certainly possible to use a SAX-style processing model to extract the RDFa information. Note that if some approach other than the DOM traversal approach defined here is used, it is important to ensure that any `meta` or `link` elements processed in the `head` of the document honour any occurrences of `base` which may appear *after* those elements. (In other words, HTML processing rules must still be applied, even if document processing takes place in a non-HTML environment such as a search indexer.)

At the beginning of processing, the [current evaluation context] is initialised as follows:

- the [base] is set to either the URL of the document or the value specified in the `base` element, if present;
- the [current resource] is set to the [base] value;
- the [list of URI mappings] is cleared;
- the [language] is cleared.

Processing then begins with the root element, and all nodes in the tree are processed according to the following rules, depth-first:

1. Any changes to the [current evaluation context] are made first:
   - the [current element] is parsed for [URI mappings] and these are added to the [list of URI mappings]. Note that a [URI mapping] will simply overwrite any current mapping in the list that has the same name;
     These mappings are provided by the `xmlns` atttribute. The value to be mapped is set by the XML namespace prefix, and the value to map is the value of the attribute--a URI. Note that the URI is not processed in any way; in particular if it is a relative path it is not resolved against the [current base]. Authors are advised to follow best practice for using namespaces, which includes not using relative paths. (See [xyz].)
   - the [current element] is parsed for any language information, and [language] is set in the [current evaluation context];
     Language information can be provided using either the general-purpose XML attribute, `xml:lang`, or the HTML attribute `lang`.
   - the [current element] is parsed for any subject information, and it is used to set the [current resource] value, in the [current evaluation context];
     The [current resource] can be set using `@about`. Note that the final value of the [current resource] is an absolute URI, which means that if `@about` contains a relative path the value must be normalised against [base] in the [current evaluation context], using the algorithm defined in RFC 3986.
2. Once the [current evaluation context] has been set, object resolution is carried out, as follows:
   - the [current object resource] is established;
     Since only one [current object resource] is set per element then some attributes will have a higher priority than others. The highest priority is given to the RDFa attribute

`resource`. If there is no `resource` attribute then the HTML `src` attribute is used, and if that is not present, the HTML `href` attribute is used. If none of these are present then a unique identifier or [bnode] is created. Note that the final value of the [current object resource] is an absolute URI, which means that if any of these attributes contain relative paths they must be normalised against [base] in the [current evaluation context], using the algorithm defined in RFC 3986.

- the [current object literal] is established;
  The [current object literal] will be set as a [plain literal] if the `content` attribute is present, *or* the body of the [current element] contains only text (i.e., there are no child elements), *or* the body of the [current element] *does* have child elements but the `datatype` attribute has an empty value. Additionally, if there is a value for [current language] then the value of the [plain literal] should include this language information, as described here:???. The actual literal is either the value of the `content` attribute (if present) *or* a string created by concatenating the inner content of each of the children in turn, of the [current element].
  The [current object literal] will be set as a [typed literal] if the `datatype` attribute is present, and does not have an empty value. The actual literal is either the value of the `content` attribute (if present) *or* a string created by concatenating the inner content of each of the children in turn, of the [current element]. The final string includes the datatype, as described here:???
  The [current object literal] will be set as an [XML literal] if the [current element] has child elements, and the `datatype` attribute is not present. The value of the [XML literal] is a string created from the inner content of the [current element], i.e., not including the element itself.

3. Once object resolution is complete the processor will have two objects, one a resource and the other a literal. These objects can now be used to create triples with the [current resource], depending on the presence of other attributes. This is achieved using the following processing steps:
   - predicates for the [current object literal] are established;
     Predicates for the [current object literal] can be set by using the `property` attribute. If present, the attribute must contain one or more [basic curies], each of which is converted to an absolute URI using CURIE processing rules, and then used to generate a triple as follows:
     subject
         [current resource]
     predicate
         expanded value from the basic curie
     object
         [current object literal]
     Note that *literal* may include language and datatype information as discussed in the section on object resolution.
   - type values for the [current object resource] are established;
     One or more 'types' for the [current object resource] can be set by using the `instanceof` attribute. If present, the attribute must contain one or more [basic curies], each of which is converted to an absolute URI using CURIE processing rules, and then used to generate a triple as follows:

subject
[current object resource]
predicate
http://www.w3.org/1999/02/22-rdf-syntax-ns#type
object
expanded value from the basic curie
If any triples are generated then the [chaining] flag is set to `true`.

- predicates for the [current object resource] are established;
Predicates for the [current object resource] can be set by using one or both of the `@rel` and `@rev` attributes.
If present, the `rel` attribute must contain one or more [basic curies], each of which is converted to an absolute URI using CURIE processing rules, and then used to generate a triple as follows:
subject
[current resource]
predicate
expanded value from the basic curie
object
[current object resource]
If present, the `rev` attribute must contain one or more [basic curies], each of which is converted to an absolute URI using CURIE processing rules, and then used to generate a triple as follows:
subject
[current object resource]
predicate
expanded value from the basic curie
object
[current resource]
If any triples are generated then the [chaining] flag is set to `true`.

4. If the [chaining] flag is set to `true` then the [current resource] is set to the value of the [current object resource], and the [chaining] flag is set to `false`.
5. The [current evaluation context] is pushed onto a stack.

NOTE: The recursive aspect of this needs to be explained a little better, in particular when we get stuff back off the stack.

5. RDFa in detail

This section provides an in-depth examination of the processing steps described in the previous section. It also includes examples which may help clarify some of the steps involved.

5.1. Changing the evaluation context

5.1.1. Setting the current resource

When triples are created they will always be in relation to the [current resource]. When parsing begins the [current resource] will be the URI of the document being parsed, or a value as set by `base`. However, as processing progresses, any `about` attributes will change the [current resource]. The value of `about` is a URI. If it is relative it is resolved against the current [base] value.

```
Daniel knows
<a about="mailto:daniel.brickley@bristol.ac.uk"
   rel="foaf:knows" href="mailto:libby.miller@bristol.ac.uk">Libby</a>.

Libby knows
<a about="mailto:libby.miller@bristol.ac.uk"
   rel="foaf:knows" href="mailto:ian.sealy@bristol.ac.uk">Daniel</a>.

<div about="photo1.jpg">
  <span class="attribution-line">this photo was taken by
    <span property="dc:creator">Mark Birbeck</span>
  </span>
</div>
```

will inherit the `about` attribute from the enclosing `div` and yield the expected triple:

```
<photo1.jpg>
   dc:creator "Mark Birbeck" .
```

5.2. Object resolution

There are two types of object, [URI resources] and [literals].

A [literal] object can be set using either the attribute `content`, or any inline text in an element. A [URI resource] object can be set using one of the attributes `href`, `resource` or `src`. Which attribute is used to generate a triple depends on how the predicate is indicated, as discussed in the next section.

5.2.1. Literal object resolution using the `content` attribute

The `content` attribute can be used to indicate a [plain literal] as follows:

```
<meta about="http://internet-apps.blogspot.com/"
      property="dc:creator" content="Mark Birbeck" />
```

or, alternatively, using the content of the element:

```
<span about="http://internet-apps.blogspot.com/"
      property="dc:creator">Mark Birbeck</span>
```

Both of these examples give the following triple:

```
<http://internet-apps.blogspot.com/>
  dc:creator "Mark Birbeck" .
```

The value of the `content` attribute is given precedence over any element content, so the following would give exactly the same triple:

```
<span about="http://internet-apps.blogspot.com/"
  property="dc:creator" content="Mark Birbeck">John Doe</span>
```

5.2.1.1. Language Tags

RDF allows [plain literal]s to have a language tag, as illustrated by the following example from [RDFTESTS-RDFMS-XMLLANG-TEST006] [p.34] :

```
<http://example.org/node>
  <http://example.org/property> "chat"@fr .
```

In RDFa the XML language attribute -- `xml:lang` -- is used to add this information, whether the plain literal is designated by the `content` attribute, or by a `datatype` value of `plaintext`:

```
<meta about="http://example.org/node"
  property="ex:property" xml:lang="fr" content="chat" />
```

Note that the value can be inherited as defined in [XML-LANG] [p.33] , so the following syntax will give the same triple as above:

```
<html xmlns="http://www.w3.org/1999/xhtml" xml:lang="fr">
  <head>
    <title xml:lang="en">Example</title>
    <meta about="http://example.org/node"
      property="ex:property" content="chat" />
  </head>
  ...
</html>
```

5.2.1.2. XML Literals

XML documents cannot contain XML mark-up in their attributes, which means it is not possible to represent XML within the `content` attribute. The following would cause an XML parser to generate an error:

```
<head about="">
  <meta property="dc:title"
    content="E = mc<sup>2</sup>: The Most Urgent Problem of Our Time" />
</head>
```

It does not help to escape the content, since the output would simply be a string of text containing numerous ampersands:

```
<>
dc:title "E = mc&amp;amp;lt;sup&amp;amp;gt;2&amp;amp;lt;/sup&amp;amp;gt;: The Most Urgent Problem of Our Time" .
```

RDF does, however, provide a datatype for indicating [XML literal]s. RDFa therefore adds this datatype to any [literal] that has child elements. For example:

```
<h2 property="dc:title">
  E = mc<sup>2</sup>: The Most Urgent Problem of Our Time
</h2>
```

would generate the expected triple:

```
<>
dc:title "E = mc<sup>2</sup>: The Most Urgent Problem of Our Time"^^rdf:XMLLiteral .
```

There will be situations where the extra mark-up is not actually part of the meaning of the literal, and can be ignored. In this situation an empty `datatype` value can be used to override the XML literal behaviour:

```
<p>You searched for <strong>Einstein</strong>:</p>
<p about="http://dbpedia.org/resource/Albert_Einstein">
  <span property="foaf:name" datatype="">Albert <strong>Einstein</strong></span>
  (March 14, 1879 â&#8364;“ April 18, 1955) was a German-born theoretical physicist.
</p>
```

Although the rendering of this page has highlighted the term the user searched for, setting `datatype` to nothing will ignore this, giving the following triples:

```
<http://dbpedia.org/resource/Albert_Einstein>
  foaf:name "Albert Einstein" .
```

Note that the value of this [XML Literal] is the exclusive canonicalization of the RDFa element's value.

clarify canonicalization

as per Elias's email, we need to clarify what this canonicalization is.

5.2.2. With `datatype`

RDF allows [literal]s to be given a data type, as illustrated by the following example from [RDFTESTS-DATATYPES-TEST001] [p.34] :

```
<http://example.org/foo>
  <http://example.org/bar> "10"^^<http://www.w3.org/2001/XMLSchema#integer> .
```

This can be represented in RDFa as follows:

```
<span about="http://example.org/foo"
  property="ex:bar" content="10" datatype="xsd:integer">ten</span>
```

EliasT comments

We need to explain which datatypes are allowed and emphasize "plaintext".

5.2.3. URI object resolution using the `href` attribute

When a triple predicate has been expressed using the `rel` attribute, the `href` attribute on the [RDFa statement]'s element is used to indicate the object as a [URI reference]. Its type, just like that of the `about` attribute, is a URI:

```
<link about="mailto:daniel.brickley@bristol.ac.uk"
      rel="foaf:knows" href="mailto:libby.miller@bristol.ac.uk" />
```

5.2.4. `rel` without `href`

When a triple predicate has been expressed using the `rel` attribute, and no `href` attribute exists on the same [RDFa element], then the CURIE [p.11] represented by this element is used as the object. Specifically, this CURIE [p.11] is affected by the `about` and `id` attributes. When neither is present, the object is a bnode (bnodes are discussed further in Section 5 [REF]). In all cases, the subject resolution for child elements is affected: where they do not override the subject, their subject is this same CURIE [p.11] here resolved as the object.

Consider, for example, a simple fragment of HTML for describing the creator of a web page, with further information about the creator, including his name and email address:

```
<div rel="dc:creator">
  <span property="foaf:name">Ben Adida</span>
  (<a property="foaf:mbox" href="mailto:ben@adida.net">ben@adida.net</a>)
```

The above yields the following triples:

```
<>
   dc:creator _:div0 .

_:div0
   foaf:name "Ben Adida" .
_:div0
   foaf:mbox <mailto:ben@adida.net> .
```

5.3. Establishing the predicate

The predicate of a statement is specified using a `property`, `instanceof`, `rel` or `rev` attribute. These attributes can be placed on any element in a document, and can co-exist on the same element. Each of these attributes accepts space-separated CURIEs, each of which will be used to generate exactly one triple. The attribute indicates the type of object to use for the triple, literal or URI. In the descriptions, the case of a single CURIE for the attributes is described; when an attribute consists of more than one (space separated) CURIES, the process is applied for each of them.

5.3.1. The `property` attribute

A `property` attribute designates a predicate whose object is a literal. The object of the triple will have been established using [literal] object resolution (See Section @@4.4). The following example indicates the name of the author responsible for the text being quoted:

```
<blockquote about="#q1">
    <p>
        Rodion Romanovitch! My dear friend! If you go on in this way
        you will go mad, I am positive! Drink, pray, if only a few drops!
    </p>
    <p>
        by <span property="dc:creator">Fyodor Dostoevsky</span>
    </p>
</blockquote>
```

5.3.2. The `rel` attribute

A `rel` attribute designates a predicate whose object is a resource. The object of the triple is determined using [URI reference] object resolution (Section 4.4). The following example indicates that one 'FOAF person' knows another:

```
Daniel <a about="mailto:daniel.brickley@bristol.ac.uk"
          rel="foaf:knows" href="mailto:libby.miller@bristol.ac.uk">knows</a> Libby.
```

The triple generated is:

```
<mailto:daniel.brickley@bristol.ac.uk>
   foaf:knows <mailto:libby.miller@bristol.ac.uk> .
```

5.3.3. The `rev` attribute

A `rev` attribute, like its cousin the `rel` attribute, indicates a predicate whose object is a resource, though its subject and object resolutions are reversed. The subject of the triple is determined using [URI reference] *object* resolution (Section 4.4). Note that resolution is effectively the same as if the `rev` attribute had been a `rel` attribute with object and subject reversed. The following example indicates that one 'FOAF person' knows another:

```
Libby <a about="mailto:daniel.brickley@bristol.ac.uk"
   rev="foaf:knows" href="mailto:libby.miller@bristol.ac.uk">knows</a> Daniel.
```

and the [triple] generated is essentially a reversal of our previous example:

```
<mailto:libby.miller@bristol.ac.uk>
   foaf:knows <mailto:daniel.brickley@bristol.ac.uk> .
```

5.3.4. Using both `rel` and `rev` attribute

It is perfectly acceptable to use both the `rel` and `rev` attributes within the same element, yielding two triples without repeating the subject and object. For example:

```
Libby and Daniel <a about="mailto:daniel.brickley@bristol.ac.uk"
   rel="foaf:knows" rev="foaf:knows"
   href="mailto:libby.miller@bristol.ac.uk" >know each other</a>.
```

expresses:

```
<mailto:libby.miller@bristol.ac.uk>
   foaf:knows <mailto:daniel.brickley@bristol.ac.uk> .
<mailto:daniel.brickley@bristol.ac.uk>
   foaf:knows <mailto:libby.miller@bristol.ac.uk> .
```

The predicates need not be the same, of course.

5.3.5. Multiple Attribute Values

The `rel`, `rev`, and `property` attributes accept multiple space-separated CURIEs as a single attribute value. When there is more than one CURIE, then each expresses the exact same triples it would if it were the single CURIE in the attribute value. For example:

```
This document was authored and published by
<a about="" rel="dc:creator dc:publisher" href="http://example.org/~markb">
    Mark Birbeck
</a>.
```

is interpreted by performing the normal subject and object resolutions dictated by the `rel` attribute on both the `dc:creator` and `dc:publisher` values. The resulting triples are:

```
<>
   dc:creator <http://example.org/~markb> .
<>
   dc:publisher <http://example.org/~markb> .
```

The same exact reasoning applies to the `rev` and `property` attributes.

5. RDF Concepts

NOTE: I intend to remove this section.

Having established the different parts of the syntax of RDFa, we will now look at the various aspects of the RDF Abstract Syntax, and see how they can be represented in RDFa.

5.1. Blank nodes

A [blank node] is generated explicitly when an [RDFa statement] uses a bnode CURIE as its subject. A [blank node] can be generated more implicitly when an XML element without an `about` attribute has `meta` or `link` child elements, also without `about` attributes of their own. In the latter case, the [unique anonymous ID] generated to identify the [blank node] is associated with the [context statement] of the `meta` and `link` elements. This allows a number of statements to be made about the same [blank node].

For example, to establish relationships between a [blank node] and literals or URIs, one can use the implicit [blank node] construction of our earlier example, repeated here:

NOTE: This is all out of date. It can probably come out, but I just want to look at the use-case a bit more to see if the example should be re-created with correct syntax.

```
<blockquote>
    <link rel="dc:source" href="urn:isbn:0140449132" />
    <meta property="dc:creator" content="Fyodor Dostoevsky" />
    <p>
        Rodion Romanovitch! My dear friend! If you go on in this way
        you will go mad, I am positive! Drink, pray, if only a few drops!
    </p>
</blockquote>
```

This would generate the following [triple]s:

```
_:a
   dc:source <urn:isbn:0140449132> .
_:a
   dc:creator "Fyodor Dostoevsky" .
```

One could also use the more explicit declaration:

```
<blockquote about="[_:a]">
    <p>
        Rodion Romanovitch! My dear friend! If you go on in this way
        you will go mad, I am positive! Drink, pray, if only a few drops!
    </p>
</blockquote>

<link about="[_:a]"
      rel="dc:source" href="urn:isbn:0140449132" />
<meta about="[_:a]"
      property="dc:creator" content="Fyodor Dostoevsky" />
```

To establish relationships between [blank node]s, the [unique anonymous ID] must be set explicity using a CURIE bnode as subject or object. For example, if our desired output is the following [triple]s:

```
_:a
   foaf:mbox <mailto:daniel.brickley@bristol.ac.uk> .
_:b
   foaf:mbox <mailto:libby.miller@bristol.ac.uk> .
_:a
   foaf:knows _:b .
```

we could use the following XHTML:

```
<link about="[_:a]" rel="foaf:mbox"
      href="mailto:daniel.brickley@bristol.ac.uk" />
<link about="[_:b]" rel="foaf:mbox"
      href="mailto:libby.miller@bristol.ac.uk" />
<link about="[_:a]" rel="foaf:knows"
      href="[_:b]" />
```

or, alternatively, if we wish to partly render the information in XHTML:

```
<div about="[_:a]">
   DanBri can be reached via
   <a rel="foaf:mbox"
      href="mailto:daniel.brickley@bristol.ac.uk">
     email
   </a>.
   He knows Libby.
   <link rel="foaf:knows" href="[_:b]" />
</div>

<div about="[_:b]">
   Libby can be reached via
   <a rel="foaf:mbox"
      href="mailto:libby.miller@bristol.ac.uk">
     email
   </a>
</div>
```

6. Examples

6.1. Creative Commons

One of the advantages of using the same syntax to make general statements as well as statements about a document is that in many cases a document can carry its own metadata. For example, if an XHTML document contains a navigable link to the Creative Commons license, this link can also be used to express metadata:

```
<div about="">
    This document is licensed under a
    <a rel="cc:license"
       href="http://creativecommons.org/licenses/by-sa/2.0/">
        Creative Commons License
    </a>
    which, among other things, requires that you provide
    attribution to the author,
    <a rel="dc:creator" href="http://ben.adida.net">Ben Adida</a>.
</div>
```

This chunk of XHTML will generate the same triples, no matter what other XHTML contains it:

```
<>
   cc:license <http://creativecommons.org/licenses/by-sa/2.0/> .
<>
   dc:creator <http://ben.adida.net> .
```

6.2. FOAF

FOAF requires the definition of at least two RDF entities: the FOAF person, and the FOAF homepage, which cannot be the same. Thus, the following XHTML can be used to represent a FOAF record:

```
<html xmlns:geo="http://www.w3.org/2003/01/geo/" ...>
    <head>
      <title property="dc:title">Dan's home page</title>
    </head>
    <body>
      <section id="person">
        <span about="[_:geolocation]">
          Dan is located at latitude
          <meta property="geo:lat">51.47026</meta>
          and longitude
          <meta property="geo:long">-2.59466</meta>
        </span>
        <link rel="rdf:type" href="[foaf:Person]" />
        <link rel="foaf:homepage" href="" />
        <link rel="foaf:based_near" href="[_:geolocation]" />
        <h1 property="foaf:name">Dan Brickley</h1>
      </section>
    </body>
</html>
```

which yields the correct FOAF triples:

```
<>
   dc:title "Dan’s home page"^^rdf:XMLLiteral .
_:geolocation
   geo:lat "51.47026"^^rdf:XMLLiteral .
_:geolocation
   geo:long "-2.59466"^^rdf:XMLLiteral .
<#person>
   rdf:type foaf:Person .
<#person>
   foaf:homepage <> .
<#person>
   foaf:based_near _:geolocation .
<#person>
   foaf:name "Dan Brickley"^^rdf:XMLLiteral .
```

If one wants to make the `foaf:Person` a blank node, then the only change required is taking out the `id="person"` from the `span` element, which then yields the following triples:

```
<>
   dc:title "Dan’s home page" .
_:geolocation
   geo:lat "51.47026" .
_:geolocation
   geo:long "-2.59466" .
_:span0
   rdf:type foaf:Person .
_:span0
   foaf:homepage <> .
_:span0
   foaf:based_near _:geolocation .
_:span0
   foaf:name "Dan Brickley" .
```

A. References

A.1. Related Specifications

This section is normative.

HTML4
"*HTML 4.01 Specification*", W3C Recommendation, D. Raggett *et al.*, *eds.*, 24 December 1999.
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XML-LANG
"*Extensible Markup Language (XML) 1.0 (Third Edition)*", W3C Recommendation, T. Bray *et al.*, *eds.*, 4 February 2004.
Available at: http://www.w3.org/TR/2004/REC-xml-20040204

A.2. Related Activities

This section is informative.

DC
Dublin Core Metadata Initiative (DCMI) (See http://dublincore.org/.)
FOAF-PROJECT
The FOAF Project (See http://www.foaf-project.org.)
N-TRIPLES
RDF Test Cases, N-Triples (See http://www.w3.org/TR/rdf-testcases/#ntriples.)
N3-PRIMER
N3 Primer (See http://www.w3.org/2000/10/swap/Primer.)
RDF-CONCEPTS
Resource Description Framework (RDF): Concepts and Abstract Syntax (See http://www.w3.org/TR/rdf-concepts/.)
RDF-SYNTAX
RDF/XML Syntax and Grammar (See http://www.w3.org/TR/rdf-syntax-grammar/.)

RDFTESTS-DATATYPES-TEST001
: datatypes/test001.nt (See http://www.w3.org/2000/10/rdf-tests/rdfcore/datatypes/test001.nt.)

RDFTESTS-RDFMS-XMLLANG-TEST006
: rdfms-xmllang/test006.nt (See http://www.w3.org/2000/10/rdf-tests/rdfcore/rdfms-xmllang/test006.nt.)

RELAXNG
: RELAX NG Home Page (See http://www.relaxng.org/.)

SWD-WG
: Semantic Web Best Deployment Working Group (See http://www.w3.org/2006/07/SWD/.)

RDFHTML
: RDF-in-HTML Task Force (See http://w3.org/2001/sw/BestPractices/HTML/.)

SWBPD-WG
: Semantic Web Best Practices and Deployment Working Group (See http://w3.org/2001/sw/BestPractices/.)

XHTML2-WG
: XHTML 2 Working Group (See http://w3.org/MarkUp/Group/.)

CURIE
: CURIEs (See http://w3.org/TR/curie.)

B. Change History

2007-09-04: Migrated to XHTML 2 Working Group Publication System. Converted to a format that is consistent with REC-Track documents. Updated to reflect current processing model. Added normative definition of CURIEs. Started updating prose to be consistent with current task force agremeents. [ShaneMcCarron], [StevenPemberton], [MarkBirbeck]

2007-04-06: fixed some of the language to talk about "structure" rather than metadata. Added note regarding space-separated values in predicate-denoting attributes. [BenAdida]

2006-01-16: made the use of CURIE type for `rel`,`rev`,`property` consistent across document (particularly section 2.4 was erroneous). [BenAdida]

C. Acknowledgments

This section is informative.

At the time of publication, the participants in the W3C XHTML 2 Working Group were: