
RDFa
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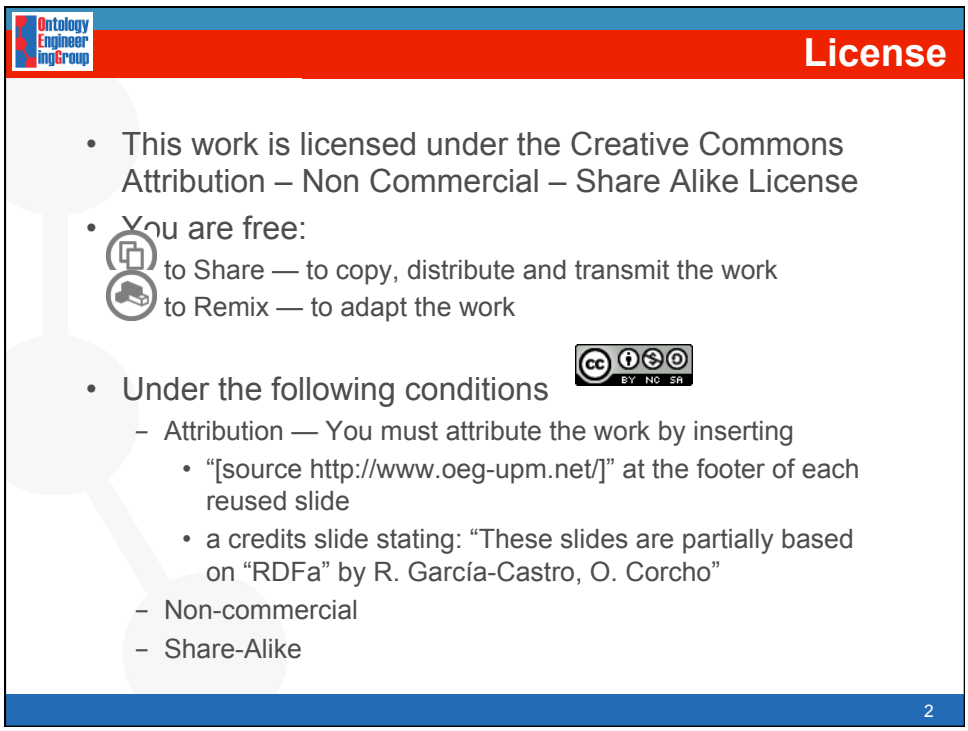
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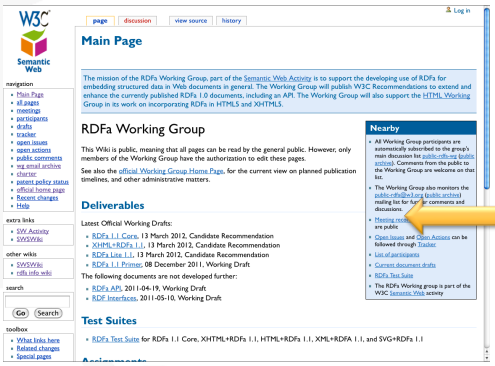
RDFa

- Goal
  - To embed RDF data into (X)HTML (and others)



- We are not discussing other alternatives:
  - Microformats
  - HTML5 microdata

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RDFa documents

- RDFa 1.1 Working Group
  - http://www.w3.org/2010/02/rdfa/
- Relevant documents
  - RDFa Core 1.1, W3C Recommendation, 22/08/2013
  - RDFa Lite 1.1, W3C Recommendation, 07/06/2012
  - XHTML+RDFa 1.1, W3C Recommendation, August 22, 2013
  - RDFa 1.1 Primer, W3C Working Group Note, June 7, 2012

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RDFa context

- RDF Syntax for embedding metadata into documents
- Specified for XHTML, HTML5 and other XML-based languages (e.g., SVG)
- Allows using generic metadata, instead of ad-hoc metadata
- RDFa-specific metadata does not have effect on visualization

	Syntax	Subject	Predicate	Resource	Type	Literal	List
RDFa Lite	vocab prefix		property	resource	typeof		
RDFa Core		about	rel rev	href src		content datatype	inlist

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RDFa Lite

	Syntax	Subject	Predicate	Resource	Type	Literal	List
RDFa Lite	vocab prefix		property	resource	typeof		
RDFa Core		about	rel rev	href src		content datatype	inlist

Syntax

- *vocab.* Defines the vocabularies used
- *prefix.* Defines IRI abbreviations, useful for multiple vocabularies

Resource

- *resource.* Defines non-navigable resources

Predicate

- *property,* Defines relationships between a subject and either a resource or a literal

Type

- *typeof.* Defines the type of a resource

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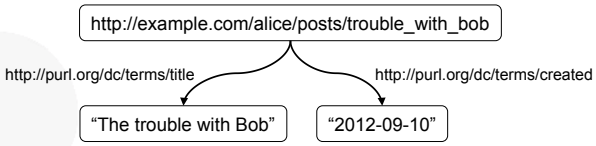
Properties

- `@property`
  - By default the subject is the document itself

```
<html>
<body>
    ...
    <h2 property="http://purl.org/dc/terms/title">The Trouble with Bob</h2>
    <p>Date:
      <span property="http://purl.org/dc/terms/created">2011-09-10</span>
    </p>
    ...
  </body>
```

```
<http://example.com/alice/posts/trouble_with_bob>
    <http://purl.org/dc/terms/title> "The Trouble with Bob" .
<http://example.com/alice/posts/trouble_with_bob>
    <http://purl.org/dc/terms/created> "2012-09-10" .
```



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Changing the base URL

- `<base>`
  - Valid for (X)HTML

```
<html xmlns="http://www.w3.org/1999/xhtml">
  <head>
    <base href="http://www.example.org/jo/blog" />
    <title property="http://purl.org/dc/terms/title">Jo's Blog</title>
  </head>
  <body>
    ...
  </body>
</html>
```

```
<http://www.example.org/jo/blog> <http://purl.org/dc/terms/title> "Jo's Blog" .
```

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Defining vocabularies

- **@vocab**
  - Can appear anywhere in the file, only affecting elements below

```
<html>
  <head>
    ...
  </head>
  <body vocab="http://purl.org/dc/terms/">
    ...
    <h2 property="title">The Trouble with Bob</h2>
    <p>Date: <span property="created">2011-09-10</span></p>
  ...
  </body>
```

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IRI abbreviations + Multiple vocabularies

- **@prefix**
  - Can appear anywhere in the file, only affecting elements below
  - Can be mixed with `@vocab`

```
<html>
  <head>
    ...
  </head>
  <body prefix="dc: http://purl.org/dc/terms/ schema: http://schema.org/">
    <div resource="/alice/posts/trouble_with_bob" typeof="schema:BlogPosting">
      <h2 property="dc:title">The trouble with Bob</h2>
      ...
      <h3 property="dc:creator" resource="#me">Alice</h3>
      <div property="schema:articleBody">
        <p>The trouble with Bob is that he takes much better photos than me:</p>
      </div>
      ...
    </div>
  </body>
</html>
```

- RDFa pre-defines a number of useful and popular prefixes
  - Good practice: always define your prefixes

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Multiple subjects per document

- `@resource`

```
<body vocab="http://purl.org/dc/terms/">
<div resource="/alice/posts/trouble_with_bob">
    <h2 property="title">The trouble with Bob</h2>
    <p>Date: <span property="created">2011-09-10</span></p>
</div>
<div resource="/alice/posts/jos_barbecue">
    <h2 property="title">Jo's Barbecue</h2>
    <p>Date: <span property="created">2011-09-14</span></p>
</div>
</body>
```

  - The innermost value has precedence

```
<div resource="/alice/posts/trouble_with_bob">
  <h2 property="title">The trouble with Bob</h2>
  <div resource="http://example.com/bob/photos/sunset.jpg">
    <img src="http://example.com/bob/photos/sunset.jpg" />
    <span property="title">Beautiful Sunset</span>
    by <span property="creator">Bob</span>.
  </div>
</div>
```

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Resources as objects

- `@resource`
  - Highest priority

```
<html xmlns="http://www.w3.org/1999/xhtml">
  <head>
    <title>On Crime and Punishment</title>
    <base href="http://www.example.com/candp.xhtml" />
  </head>
  <body>
    <blockquote about="#q1" property="dc:source" resource="urn:ISBN:0140449132" >
      <p id="q1"> Rodion Romanovitch! My dear friend! </p>
    </blockquote>
  </body>
</html>
```

```
<http://www.example.com/candp.xhtml#q1> <http://purl.org/dc/terms/source>
    <urn:ISBN:0140449132> .
```

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Typing resources and blank nodes

- `@typeof`
  - Implicit `rdf:type` predicate
  - Highest priority

```
<div resource="http://dbpedia.org/resource/Albert_Einstein" typeof="foaf:Person">
  <span property="foaf:name">Albert Einstein</span>
  <span property="foaf:givenName">Albert</span>
</div>
```

```
<http://dbpedia.org/resource/Albert_Einstein> rdf:type foaf:Person .
<http://dbpedia.org/resource/Albert_Einstein> foaf:namee “Albert Einstein” .
<http://dbpedia.org/resource/Albert_Einstein> foaf:givenName “Albert” .
```

- `@typeof` for creating a new context, i.e., blank node

```
<div typeof="foaf:Person">
  <span property="foaf:name">Albert Einstein</span>
  <span property="foaf:givenName">Albert</span>
</div>
```

```
_:a rdf:type foaf:Person .
_:a foaf:name "Albert Einstein" .
_:a foaf:givenName "Albert" .
```

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RDFa Core

	Syntax	Subject	Predicate	Resource	Type	Literal	List
RDFa Lite	vocab prefix		property	resource	typeof		
RDFa Core		about	rel rev	href src		content datatype	inlist

Resource
- *href.* Defines a resource from a navigable IRI
- *src.* Defines a resource from an embedded object

Subject
- *about.* Defines triple subjects

Predicate
- *rel.* Defines relationships between two resources
- *rev.* Defines reverse relationships between two resources

Literal
- *content.* Defines literals
- *datatype.* Defines the datatype of a literal

List
- *inlist.* Defines lists and empty lists

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Changing the current subject

- By default the subject is the document itself
- `<base>` may change the subject in (X)HTML
- `@resource` may define multiple subjects
- **`@about`**
  - Unlike `@resource`, `@about` is only used to set the subject

```
<ul>
  <li about="http://example.com/alice/posts/trouble_bob" property="dc:title">
    The trouble with Bob
  </li>
  <li about="http://example.com/alice/posts/jos_barbecue" property="dc:title">
    Jo's Barbecue
  </li>
  ...
</ul>
```

```
<http://example.com/alice/posts/trouble_bob> dc:title "The trouble with Bob" .
<http://example.com/alice/posts/jos_barbecue> cd:title "Jo's Barbecue" .
```

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Subject inheritance

- When neither `@about` or `@typeof` are present
- Inheriting subject from `@resource`

```
<div about="http://dbpedia.org/resource/Albert_Einstein">
  <span property="foaf:name">Albert Einstein</span>
  <div property="dbp:birthPlace" resource="http://dbpedia.org/German_Empire">
    <span property="dbp:conventionalLongName">the German Empire</span>
  </div>
</div>
```

```
<http://dbpedia.org/resource/Albert_Einstein> foaf:name "Albert Einstein" .
<http://dbpedia.org/resource/Albert_Einstein> dbp:birthPlace
    <http://dbpedia.org/German_Empire> .
<http://dbpedia.org/resource/German_Empire> dbp:conventionalLongName
    "the German Empire" .
```

- Inheriting an anonymous subject

```
<div about="http://dbpedia.org/Baruch_Spinoza" property="dbp-owl:influenced">
  <div>
    <span property="foaf:name">Albert Einstein</span>
  </div>
</div>
```

```
<http://dbpedia.org/Baruch_Spinoza> dbp-owl:influenced _:a .
_:a foaf:name "Albert Einstein" .
```

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Relationships between resources

- `@property`
- **`@rel`**
  - Establishes a relationship between the current subject as subject and the current object as object
- **`@rev`**
  - Establishes a relationship between the current object as subject and the current subject as object

```
<div vocab="http://xmlns.com/foaf/0.1/" about="#me">
  My name is <span property="name">John Doe</span> and my blog is called
  <a rel="homepage" href="http://example.org/blog/">Understanding Semantics</a>.
</div>
```

```
@prefix foaf: <http://xmlns.com/foaf/0.1/> .
<#me> foaf:name "John Doe" ;
      foaf:homepage <http://example.org/blog/> .
```

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Defining resources

- When no `@resource` is present
- **`@href`**
  - Navigable IRI
- **`@src`**
  - Embedded object IRI

```
<link about="mailto:john@example.org" rel="foaf:knows"
href="mailto:sue@example.org" />
```

```
<mailto:john@example.org> foaf:knows <mailto:sue@example.org>
```

```
<img about="http://www.blogger.com/profile/1109404" src="photo1.jpg"
  rev="dc:creator" rel="foaf:img"/>
```

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

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Typing resources (II)

- `@typeof + @resource`
- **`@typeof + @about`**

```
<div about="http://dbpedia.org/resource/Albert_Einstein" typeof="foaf:Person">
<span property="foaf:name">Albert Einstein</span>
</div>
```

```
<http://dbpedia.org/resource/Albert_Einstein> rdf:type foaf:Person .
```

- **`@typeof + @rel`**

```
<div about="http://dbpedia.org/resource/Albert_Einstein">
  <div rel="dbp:birthPlace" resource="http://dbpedia.org/resource/German_Empire"
       typeof="http://schema.org/Country">
  </div>
</div>
```

```
<http://dbpedia.org/resource/German_Empire> rdf:type <http://schema.org/
Country> .
```

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Literals

- Plain literals: `@content` (precedence)

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

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

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

- Plain literals with language tag: `"@en"`

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

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

- Typed literals: `@datatype`

```
<span property="cal:dtstart" content="2015-09-16T16:00:00-05:00"
        datatype="xsd:dateTime"> September 16th at 4pm </span>.
```

```
<> cal:dtstart "2015-09-16T16:00:00-05:00"^^xsd:dateTime .
```

XML Literals

- XML literals: `@datatype="rdf:XMLLiteral"`

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

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

- "Plain" XML literals: `@datatype=""`

```
<p about="http://dbpedia.org/resource/Albert_Einstein"> <span
property="foaf:name" datatype="">Albert <strong>Einstein</strong></span>. </p>
```

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

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Lists

- `@inlist`.
  - Object should be put in a list with common predicate and subject
  - The order in the list is determined by the document order

```
<p prefix="bibo: http://purl.org/ontology/bibo/ dc: http://purl.org/dc/terms/
  typeof="bibo:Chapter">
  "<span property="dc:title">Semantic Annotation and Retrieval</span>" by
  <a inlist="" property="dc:creator" href="http://ben.adida.net/#me">
    Ben Adida
  </span>,
  <a inlist="" property="dc:creator" href="http://twitter.com/markbirbeck">
    Mark Birbeck
  </span>, and
  <a inlist="" property="dc:creator" href="http://www.ivan-herman.net/foaf#me">
    Ivan Herman
  </span>.
</p>
```

- Empty list

```
<span rel="prop" resource="rdf:nil"/>
```

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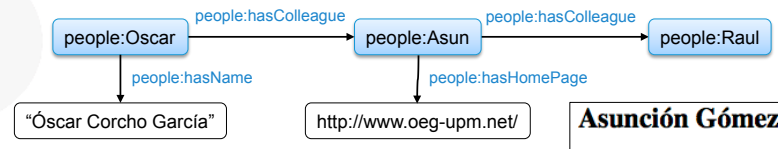
RDFa example



Asunción Gómez Pérez

Has a home page.
Is friend of Raúl.

Óscar Corcho García

Is friend of Asun.

```
<html>
<head>
  <meta http-equiv="Content-Type" content="text/html; cha
</head>
<body vocab="http://www.ontologies.org/ontologies/people#
  <div resource="Asun">
    <h2 property="hasName">Asunción Gómez Pérez</h2>
    <a rel="hasHomePage" href="http://www.oeg-upm.net/">Has home page.</a>
    <div property="hasColleague" resource="Raul”>Is friend of Raúl.</div>
  </div>
  <div resource="Oscar">
    <h2 property=”hasName">Óscar Corcho García</h2>
    <div property=”hasColleague" resource=”Asun”>Is friend of Asun.</div>
  </div>
</body>
</html>
```

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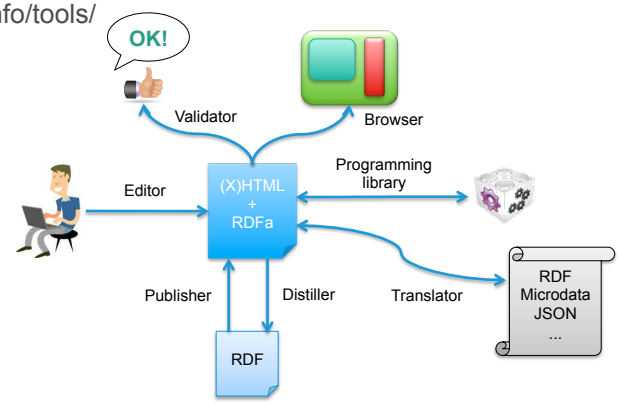
RDFa Tools

- RDFa tool lists
  - http://www.w3.org/2001/sw/wiki/RDFa
  - http://rdfa.info/tools/



- **Beware of the RDFa version!**

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RDFa editors and browsers

Editors

- Online
  - **RDFaCE**
    - http://aksw.org/Projects/RDFaCE
- Standalone
  - TopBraid Composer
    - http://www.topquadrant.com/products/TB_Composer.html

Browsers

- Online
  - **RDFa / Play**
    - http://rdfa.info/play/
  - Structured Data Linter
    - http://linter.structured-data.org/
  - RDF Distiller
    - http://rdf.greggkellogg.net/distiller
- Firefox extension
  - **RDFa Developer**
    - https://bitbucket.org/fundacionctic/rdfadev/wiki/Home
    - https://addons.mozilla.org/en-US/firefox/addon/rdfa-developer/

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RDFa validators

Validators

- Online
  - **check-rdfa**
    - http://check.rdfa.info/
  - **W3C Nu Markup Validation Service**
    - http://validator.w3.org/nu/
  - W3C (X)HTML Validator (using the right DTD)
    - http://validator.w3.org/
- Standalone
  - Total Validator ((X)HTML validator with RDFa validation)
    - http://www.totalvalidator.com/

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RDFa publishers and distillers

RDFa publishers (RDF→RDFa)

- Online
  - **RDF2HTML+RDFa** (XSL style sheet)
    - http://rhizomik.net/html/redefer/
    - http://rhizomik.net/redefer/rdf2html-form (demo)
  - **RDF2RDFa Converter** (XSLT transformation)
    - http://www.ebusiness-unibw.org/tools/rdf2rdfa/

RDFa Distillers (RDFa→RDF)

- Online
  - **RDFa 1.1 Distiller and Parser**
    - http://www.w3.org/2012/pyRdfa/Overview.html
  - RDFa Distiller and Parser
    - http://www.w3.org/2007/08/pyRdfa/
- Standalone
  - Krextor
    - http://trac.kwarc.info/krextor/

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RDFa translators and APIs

Translators

- Online
  - **RDF Translator** (multiformat)
    - http://rdf-translator.appspot.com/
  - **RDF Distiller** (multiformat)
    - http://rdf.kellogg-assoc.com/distiller

Programming libraries

- Perl
  - RDF-RDFa-Parser
    - http://search.cpan.org/dist/RDF-RDFa-Parser/
- Java
  - java-rdfa
    - https://github.com/shellac/java-rdfa#readme

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