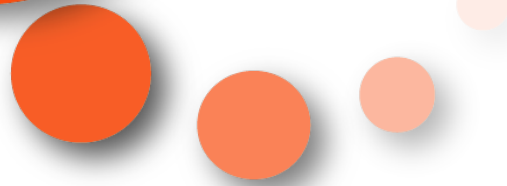




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COMMENT DÉCRIRE SÉMANTIQUEMENT DES DONNÉES?

HOW DO WE DESCRIBE DATA WITH VOCABULARIES?

Legacy data



BY USING FORMAT
EXTENSIONS
JSON-LD
CSV ON THE WEB
RDF-A
....

BY USING DEDICATED
VOCABULARIES
WEB ANNOTATION MODEL

Vocabulary



Vocabulary



Vocabulary



POPULAR OPEN-STANDARD DATA FORMATS



JavaScript Object Notation (JSON) is

- uses human-readable text to transmit data objects
- consists of attribute-value pairs and array data types

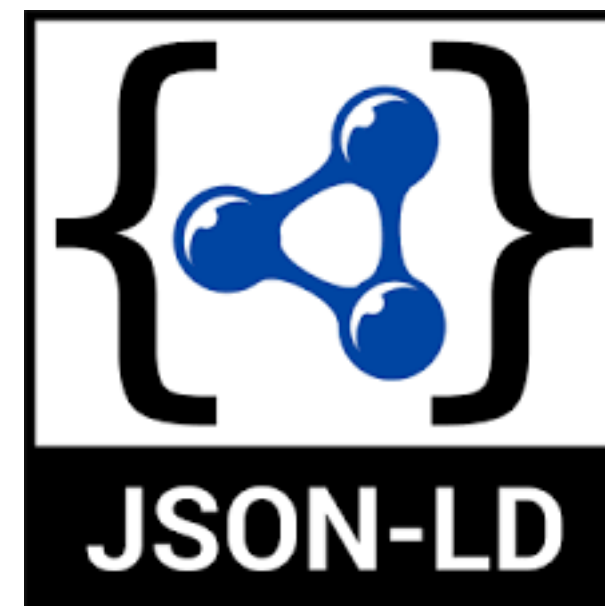
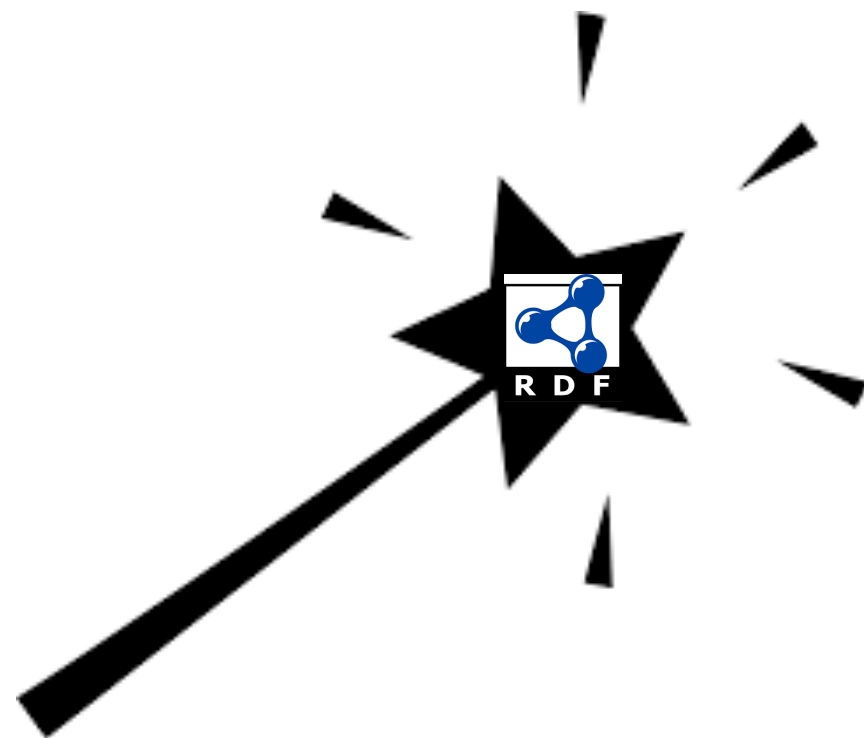
**PROVIDE SYNTACTIC INTEROPERABILITY
BUT NOT SEMANTIC INTEROPERABILITY**

Comma-separated values (CSV)

- is a delimited text file format using comma to separate values.
- stores tabular data where each line of the file is a data record consisting in of one or more fields, separated by commas.



{JSON}



GOAL

<https://www.w3.org/TR/json-ld/>



▶ Take advantage of JSON

```
{  
  "name": "Nathalie Hernandez",  
  "homepage": "https://www.irit.fr/~Nathalie.Hernandez",  
  "image": "http://www.irit.fr/images/nath.png"  
}
```

▶ ADD vocabularies

- ▶ give object types
- ▶ associate keys/values with IRI
- ▶ define context in which terms are defined

▶ Preserve concision



JSON-LD RESERVED KEYWORDS

@context

Used to define the short names called terms to express specific identifiers

@id

Used to uniquely identify *resources* that are being described in the document with [IRIs](#) or [blank node identifiers](#).

@value

Used to specify the data that is associated with a [property](#)

@language

Used to specify the language for a particular string value or the default language of a JSON-LD document.

@type

Used to set the data type of a [node](#) or [typed value](#).

@container

Used to set the default container type for a [term](#).

@list

Used to express an ordered set of data.

@set

Used to express an unordered set of data and to ensure that values are always represented as arrays.

@reverse

Used to express reverse properties.

@index

Used to specify that a container is used to index information and that processing should continue deeper into a JSON data structure.

@base

Used to set the base IRI against which [relative IRIs](#) are resolved.

@vocab

Used to expand properties and values in **@type** with a common prefix [IRI](#).

@graph

Used to express a [graph](#).

:

The separator for JSON keys and values that use [compact IRIs](#).

A FIRST EXAMPLE

```
{  
  "http://schema.org/name": "Nathalie Hernandez » ,  
  "http://schema.org/url": { "@id": "https://www.irit.fr/~Nathalie.Hernandez" },  
  "http://schema.org/image": { "@id": "http://www.irit.fr/images/nat.png" }  
}
```

verbose !

<http://json-ld.org/contexts/person.jsonld>

USING CONTEXT

```
{
  "@context":
  {
    "name": "http://schema.org/name",
    "image": {
      "@id": "http://schema.org/image",
      "@type": "@id"
    },
    "homepage": {
      "@id": "http://schema.org/url",
      "@type": "@id"
    }
  },
  "name": "Nathalie Hernandez",
  "homepage": "https://www.irit.fr/~Nathalie.Hernandez",
  "image": "http://www.irit.fr/images/nat.png"
}
```

```
{
  "@context":
  {
    "name": "http://schema.org/name",
    "image": {
      "@id": "http://schema.org/image",
      "@type": "@id"
    },
    "homepage": {
      "@id": "http://schema.org/url",
      "@type": "@id"
    }
  },
}
```

```
{
  "@context": "http://json-ld.org/contexts/person.jsonld",
  "name": "Nathalie Hernandez",
  "homepage": "https://www.irit.fr/~Nathalie.Hernandez" ,
  "image": "http://www.irit.fr/images/nat.png"
}
```

IDENTIFYING - TYPING

```
{
  "@context": {
    ...
    "Restaurant": "http://schema.org/Restaurant",
    "Brewery": "http://schema.org/Brewery"
  }
  "@id": "http://example.org/places#BrewEats",
  "@type": [ "Restaurant", "Brewery" ],
  ...
}
```

```
{
  "@context": {
    "xsd": "http://www.w3.org/2001/XMLSchema#",
    "name": "http://xmlns.com/foaf/0.1/name",
    "age": {
      "@id": "http://xmlns.com/foaf/0.1/age",
      "@type": "xsd:integer"
    },
    "homepage": {
      "@id": "http://xmlns.com/foaf/0.1/homepage",
      "@type": "@id"
    }
  },
  "@id": "http://ns.irit.fr/people#nat",
  "name": "Nathalie Hernandez",
  "age": "39",
  "homepage": [
    "https://www.irit.fr/~Nathalie.Hernandez",
    "https://www.univ-tlse.fr/mathInfo/~Nathalie.Hernandez"
  ]
}
```


IDENTIFYING - TYPING

```
{
  "@context": {
    "label": « http://www.w3.org/2000/01/rdf-schema#label",
    "@base": "http://example.com/document.jsonld"
  },
  "@id": "",
  "label": "Just a simple document"
}
```

```
{
  "@context":
  {
    "modified":
    {
      "@id": "http://purl.org/dc/terms/modified"
    }
  },
  ...
  "modified":
  {
    "@value": "2010-05-29T14:17:39+02:00",
    "@type": "http://www.w3.org/2001/XMLSchema#dateTime"
  }
  ...
}
```

FACILITATING VOCABULARY REUSE

```
{
  "@context": {
    "@vocab": "http://schema.org/"
  }
  "@id": "http://example.org/places#BrewEats",
  "@type": "Restaurant",
  "name": "Brew Eats"
  ...
}
```

```
{
  "@context":
  {
    "xsd": "http://www.w3.org/2001/XMLSchema#",
    "foaf": "http://xmlns.com/foaf/0.1/",
    "foaf:homepage": { "@type": "@id" },
    "picture": { "@id": "foaf:depiction", "@type": "@id" }
  },
  "@id": "http://ns.irit.fr/people#nat",
  "@type": "foaf:Person",
  "foaf:name": "Nathalie Hernandez",
  "foaf:homepage": "https://www.irit.fr/~Nathalie.Hernandez",
  "picture": "http://twitter.com/account/profile_image/nathUTM"
}
```

EMBEDDING / DEFINING GRAPHS

```
{
...
  "name": "Nathalie Hernandez",
  "knows":
  {
    "@type": "Person",
    "name": « Nicolas Seydoux »,
  }
...
}
```

```
{
  "@context": {
    "generatedAt": {
      "@id": "http://www.w3.org/ns/prov#generatedAtTime",
      "@type": "http://www.w3.org/2001/XMLSchema#date"
    },
    "Person": "http://xmlns.com/foaf/0.1/Person",
    "name": "http://xmlns.com/foaf/0.1/name",
    "knows": "http://xmlns.com/foaf/0.1/knows"
  },
  "@id": "http://example.org/graphs/73",
  "generatedAt": "2012-04-09",
  "@graph":
  [
    {
      "@id": "http://ns.irit.fr/people#nat",
      "@type": "Person",
      "name": "Nathalie Hernandez",
      "knows": "http://ns.irit.fr/people#nico"
    },
    {
      "@id": "http://ns.irit.fr/people#nico",
      "@type": "Person",
      "name": "Nicolas Seydoux",
      "knows": « http://ns.irit.fr/people#elodie"
    }
  ]
}
```

SETTING THE LANGUAGE

```
{
  "@context":
  {
    ...
    "@language": "ja"
  },
  "name": "花澄",
  "occupation": "科学者"
}
```

```
{
  "@id": "http://example.org/articles/8",
  "dc:title":
  [
    {
      "@value": "Das Kapital",
      "@language": "de"
    },
    {
      "@value": "Capital",
      "@language": "en"
    }
  ]
}
```



- ▶ Very popular format
- ▶ JSON-LD is a document format
- ▶ JSON-LD can be included in HTML documents

CSV ON THE WEB

- ▶ W3C Working Group Note 25 February 2016
- ▶ adding metadata to a CSV file by creating a `metadata.json` file

```
{
  "@context": "http://www.w3.org/ns/csvw",
  "url": "MyCSVFile.csv"
}
```


A VOCABULARY TO DESCRIBE CSV

← → ↻ <https://www.w3.org/ns/csvw> 🔍 ☆ 🌱 🗨️ 🧩 📄 📁 📧 📧

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CSVW Namespace Vocabulary Terms

[W3C Document 06 June 2017](#) 

Latest editor's draft:
<http://w3c.github.io/csvw/ns/>

Editor:
Gregg Kellogg ([Kellogg Associates](#))

Repository:
[We are on GitHub](#)
[File a bug](#)

Changes:
[Commit history](#)

This document is also available in these non-normative formats: [Turtle](#) and [JSON-LD](#)

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Abstract

This document describes the CSVW Namespace Vocabulary Terms and Term definitions used for creating Metadata descriptions for Tabular Data. This document provides the RDFS [\[RDF-SCHEMA\]](#) vocabulary definition for terms defined in [\[tabular-metadata\]](#) and a description of the JSON-LD context definition for use with defining metadata documents.

Alternate versions of the vocabulary definition exist in [Turtle](#) and [JSON-LD](#), which also includes the `@context` required for metadata descriptions. These versions may also be retrieved from <http://www.w3.org/ns/csvw>

EXPLICITONS COLUMNS

```
"country", "country group", "name (en)", "name (fr)", "name (de)", "latitude", "longitude"
"at", "eu", "Austria", "Autriche", "Österreich", "47.6965545", "13.34598005"
"be", "eu", "Belgium", "Belgique", "Belgien", "50.501045", "4.47667405"
"bg", "eu", "Bulgaria", "Bulgarie", "Bulgarien", "42.72567375", "25.4823218"
```

```
{
  "@context": "http://www.w3.org/ns/csvw",
  "url": "countries.csv"
  "tableSchema": {
    "columns": [{
      "titles": "country"
    }, {
      "titles": "country group"
    }, {
      "titles": "name (en)"
    }, {
      "titles": "name (fr)"
    }, {
      "titles": "name (de)"
    }, {
      "titles": "latitude"
    }, {
      "titles": "longitude"
    }
  ]
}
```

```
{
  "@context": "http://www.w3.org/ns/csvw",
  "url": "countries.csv"
  "tableSchema": {
    "columns": [{
      "titles": "country",
      "dc:description": "The ISO two-letter code for a country, in lowercase."
    }, {
      "titles": "country group",
      "dc:description": "A lowercase two-letter code for a group of countries."
    }, {
      "titles": "name (en)",
      "dc:description": "The official name of the country in English."
    }, {
      "titles": "name (fr)",
      "dc:description": "The official name of the country in French."
    }, {
      "titles": "name (de)",
      "dc:description": "The official name of the country in German."
    }, {
      "titles": "latitude",
      "dc:description": "The latitude of an indicative point in the country."
    }, {
      "titles": "longitude",
      "dc:description": "The longitude of an indicative point in the country."
    }
  ]
}
```

NON « STANDARD » CSV FILES

```
{
  "@context": "http://www.w3.org/ns/csvw",
  "url": "http://example.org/data/unemployment.tsv",
  "dialect": {
    "delimiter": "\t",
    "headerRowCount": 3
  }
}
```

DESCRIBING TABLES

```
{
  "@context": "http://www.w3.org/ns/csvw",
  "dc:title": "Unemployment in Europe (monthly)",
  "dc:description": "Harmonized unemployment data for European countries.",
  "dc:creator": "Eurostat",
  "tables": [{
    "url": "countries.csv",
    "dc:title": "Countries"
  }, {
    "url": "country-groups.csv",
    "dc:title": "Country groups"
  }, {
    "url": "unemployment.csv",
    "dc:title": "Unemployment (monthly)",
    "dc:description": "The total number of people unemployed"
  }]
}
```

```
{
  "@context": "http://www.w3.org/ns/csvw",
  "schema:name": "Unemployment in Europe (monthly)",
  "schema:description": "Harmonized unemployment data for European countries.",
  "schema:creator": { "schema:name": "Eurostat" },
  "tables": [{
    "url": "countries.csv",
    "schema:name": "Countries"
  }, {
    "url": "country-groups.csv",
    "schema:name": "Country groups"
  }, {
    "url": "unemployment.csv",
    "schema:name": "Unemployment (monthly)",
    "schema:description": "The total number of people unemployed"
  }]
}
```

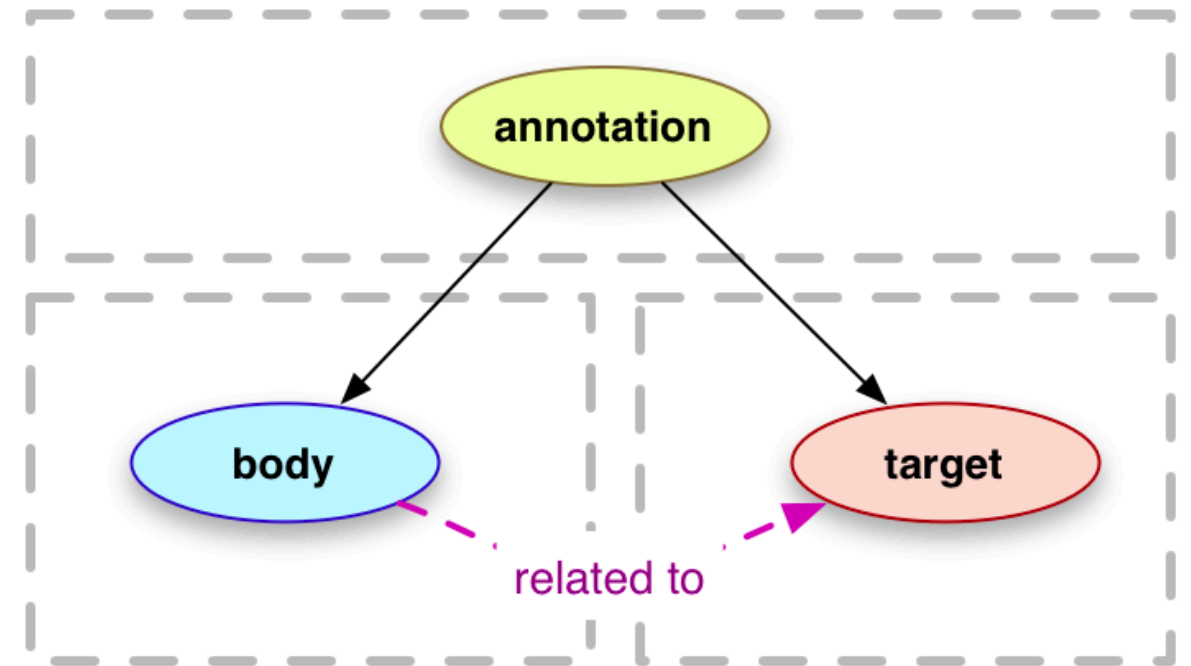



Web Annotation Data Model

- ▶ W3C Recommendation 23 February 2017 for annotations to be shared between systems
- ▶ « Annotating » is « the act of creating associations between distinct pieces of information »,
- ▶ Annotation can correspond to comments about online resources (shared photos or videos, reviews of products, or even social network mentions of web resources)
- ▶ Annotations created by or intended for machines are also possible

A simple model

- ▶ Data Model built using Linked Data fundamentals
 - ▶ recommandez serialization format : JSON-LD
- ▶ Intended to allow non-graph-based implementations so inferencing is not a priority



Annotations have 0 or more Bodies.

Annotations have 1 or more Targets.

A simple model - classes / properties for Annotations

Term	Type	Description
@context	Property	The context that determines the meaning of the JSON as an Annotation. The Annotation must have 1 or more @context values and http://www.w3.org/ns/anno.jsonld must be one of them. If there is only one value, then it must be provided as a string.
id	Property	The identity of the Annotation. An Annotation must have exactly 1 IRI that identifies it.
type	Relationship	The type of the Annotation. An Annotation must have 1 or more types, and the Annotation class must be one of them.
Annotation	Class	The class for Web Annotations. The Annotation class must be associated with an Annotation using type .
body	Relationship	The relationship between an Annotation and its Body. There should be 1 or more body relationships associated with an Annotation but there may be 0.
target	Relationship	The relationship between an Annotation and its Target. There must be 1 or more target relationships associated with an Annotation.

A simple model - classes / properties for Body and Target

```
{
  "@context": "http://www.w3.org/ns/anno.jsonld",
  "id": "http://example.org/anno3",
  "type": "Annotation",
  "body": {
    "id": "http://example.org/video1",
    "type": "Video"
  },
  "target": {
    "id": "http://example.org/website1",
    "type": "Text"
  }
}
```

```
{
  "@context": "http://www.w3.org/ns/anno.jsonld",
  "id": "http://example.org/anno2",
  "type": "Annotation",
  "body": {
    "id": "http://example.org/analysis1.mp3",
    "format": "audio/mpeg",
    "language": "fr"
  },
  "target": {
    "id": "http://example.gov/patent1.pdf",
    "format": "application/pdf",
    "language": ["en", "ar"],
    "textDirection": "ltr",
    "processingLanguage": "en"
  }
}
```

Term	Type	Description
id	Property	The IRI that identifies the Body or Target resource. Bodies or Targets which are External Web Resources must have exactly 1 id with the value of the resource's IRI .
format	Property	The format of the Web Resource's content. The Body or Target should have exactly 1 format associated with it, but may have 0 or more. The value of the property should be the media-type of the format, following the [rfc6838] specification.
language	Property	The language of the Web Resource's content. The Body or Target should have exactly 1 language associated with it, but may have 0 or more, for example if the language cannot be identified or the resource contains a mix of languages. The value of the property should be a language code following the [bcp47] specification.
processingLanguage	Property	The language to use for text processing algorithms such as line breaking, hyphenation, which font to use, and similar. Each Body and Target may have exactly 1 processingLanguage . The value of the property should be a language code following the [bcp47] specification. If this property is not present and the language property is present with a single value, then the client should use that language for processing requirements.
textDirection	Relationship	The overall base direction of the text in the resource. The Body or Target may have exactly 1 textDirection associated with it. The value of the property must be one of the directions defined below (ltr , rtl , or auto).

Term	Type	Description
type	Relationship	The type of the Body or Target resource. The Body or Target may have 1 or more types , and if so, the value should be drawn from the list of classes below, but may come from other vocabularies.
Dataset	Class	The class for a resource which encodes data in a defined structure.
Image	Class	The class for image resources, primarily intended to be seen.
Video	Class	The class for video resources, with or without audio.
Sound	Class	The class for a resource primarily intended to be heard.
Text	Class	The class for a resource primarily intended to be read.

TEXTUAL BODY

The fundamental features of a Textual Body are:

Term	Type	Description
id	Property	The IRI that identifies the Textual Body. The Body may have exactly 1 IRI that identifies it.
type	Relationship	The type of the Textual Body resource. The Body should have the TextualBody class, and may have other classes.
TextualBody	Class	A class assigned to the Body for embedding textual resources within the Annotation. The Body should have the TextualBody class.
value	Property	The character sequence of the content of the Textual Body. There must be exactly 1 value property associated with the TextualBody.

```
{
  "@context": "http://www.w3.org/ns/anno.jsonld",
  "id": "http://example.org/anno5",
  "type": "Annotation",
  "body": {
    "type": "TextualBody",
    "value": "<p>j 'adore !</p>",
    "format": "text/html",
    "language": "fr"
  },
  "target": "http://example.org/photo1"
}
```


MULTIPLE BODY OR TARGET

```
{
  "@context": "http://www.w3.org/ns/anno.jsonld",
  "id": "http://example.org/anno9",
  "type": "Annotation",
  "body": {
    "type": "TextualBody",
    "value": "tag1"
  },
  "target": [
    "http://example.org/image1",
    "http://example.org/image2"
  ]
}
```

```
{
  "@context": "http://www.w3.org/ns/anno.jsonld",
  "id": "http://example.org/anno10",
  "type": "Annotation",
  "body": {
    "type": "Choice",
    "items": [
      {
        "id": "http://example.org/note1",
        "language": "en"
      },
      {
        "id": "http://example.org/note2",
        "language": "fr"
      }
    ]
  },
  "target": "http://example.org/website1"
}
```

LIFE CYCLE INFORMATION / LICENCE

```
{
  "@context": "http://www.w3.org/ns/anno.jsonld",
  "id": "http://example.org/anno11",
  "type": "Annotation",
  "creator": "http://example.org/user1",
  "created": "2015-01-28T12:00:00Z",
  "modified": "2015-01-29T09:00:00Z",
  "generator": "http://example.org/client1",
  "generated": "2015-02-04T12:00:00Z",
  "rights": "http://creativecommons.org/licenses/by-nc/4.0/",
  "body": {
    "id": "http://example.net/review1",
    "creator": "http://example.net/user2",
    "created": "2014-06-02T17:00:00Z"
  },
  "target": "http://example.com/restaurant1"
}
```

AGENT

Term	Type	Description
id	Property	The IRI that identifies the agent. An Agent should have exactly 1 IRI that identifies it, and must not have more than 1.
type	Relationship	The type of the Agent. An Agent should have 1 or more classes, from those listed below.
Person	Class	The class for a human agent.
Organization	Class	The class for an organization, as opposed to an individual.
Software	Class	The class for a software agent, such as a user's client or a machine learning system that creates Annotations.
name	Property	The name of the agent. Each agent should have exactly 1 name property, and may have 0 or more other names.
nickname	Property	The nickname of the agent. Each agent should have exactly 1 nickname property, and may have 0 or more other nicknames.
email	Relationship	The email address associated with the agent, using the mailto: IRI scheme as defined in RFC6086 . Each agent may have 1 or more email addresses.
email_sha1	Property	The text representation of the result of applying the sha1 algorithm to the email IRI of the agent, including the 'mailto:' prefix and no whitespace. This allows the mail address to be used as an identifier without publishing the address publicly. Each agent may have 1 or more values in the email_sha1 property.
homepage	Relationship	The home page for the agent. Each agent may have 1 or more home pages.

```
{
  "@context": "http://www.w3.org/ns/anno.jsonld",
  "id": "http://example.org/anno12",
  "type": "Annotation",
  "creator": {
    "id": "http://example.org/user1",
    "type": "Person",
    "name": "My Pseudonym",
    "nickname": "pseudo",
    "email_sha1": "58bad08927902ff9307b621c54716dcc5083e339"
  },
  "generator": {
    "id": "http://example.org/client1",
    "type": "Software",
    "name": "Code v2.1",
    "homepage": "http://example.org/client1/homepage1"
  },
  "body": "http://example.net/review1",
  "target": "http://example.com/restaurant1"
}
```

AUDIENCE

Term	Type	Description
id	Property	The IRI that identifies the Audience. There may be exactly 1 IRI given that identifies the Audience.
type	Relationship	The type of the Audience, from the schema.org class structure. The Audience should have 1 or more types and they should come from the schema.org class structure.
audience	Relationship	The relationship between an Annotation and its intended Audience. There may be 0 or more Audiences for each Annotation.

Further properties that describe the audience are used from schema.org's [Audience](http://schema.org/Audience) classes. The properties and class names **must** be prefixed in the JSON with **schema:** to ensure that they are uniquely distinguished from any other properties or classes.

```
{
  "@context": "http://www.w3.org/ns/anno.jsonld",
  "id": "http://example.org/anno13",
  "type": "Annotation",
  "audience": {
    "id": "http://example.edu/roles/teacher",
    "type": "schema:EducationalAudience",
    "schema:educationalRole": "teacher"
  },
  "body": "http://example.net/classnotes1",
  "target": "http://example.com/textbook1"
}
```

MOTIVATION

Term	Type	
motivation	Relationship	The relationship between an Annotation and its Motivation. There should be exactly 1 motivation for an Annotation. There may be 0 or more purposes for an Annotation.
purpose	Relationship	The reason for the inclusion of an Annotation. There may be 0 or more purposes for an Annotation.
Motivation	Class	The Motivation for an Annotation. Things like Replying to another annotation, Commenting on a resource, or Linking to a related resource.
Motivations		
assessing	Instance	The motivation for when the user intends to assess the target resource in some way, rather than simply make a comment about it. For example to write a review or assessment of a book, assess the quality of a dataset, or provide an assessment of a student's work.
bookmarking	Instance	The motivation for when the user intends to create a bookmark to the Target or part thereof. For example an Annotation that bookmarks the point in a text where the reader finished reading.
classifying	Instance	The motivation for when the user intends to classify the Target as something. For example to classify an image as a portrait.
commenting	Instance	The motivation for when the user intends to comment about the Target. For example to provide a commentary about a particular PDF document.
describing	Instance	The motivation for when the user intends to describe the Target, as opposed to (for example) a comment about it. For example describing the above PDF's

```

{
  "@context": "http://www.w3.org/ns/anno.jsonld",
  "id": "http://example.org/anno15",
  "type": "Annotation",
  "motivation": "bookmarking",
  "body": [
    {
      "type": "TextualBody",
      "value": "readme",
      "purpose": "tagging"
    },
    {
      "type": "TextualBody",
      "value": "A good description of the topic that bears further investigation",
      "purpose": "describing"
    }
  ],
  "target": "http://example.com/page1"
}
    
```



ANNOTATING CSV CELLS


```
{
  "@context": "http://www.w3.org/ns/csvw",
  "url": "countries.csv",
  "notes": [{
    "type": "Annotation",
    "target": "countries.csv#cell=2,6-*,7",
    "body": "These locations are of representative points.",
    "motivation": "commenting"
  }, {
    "type": "Annotation",
    "target": "countries.csv#cell=3,4",
    "body": "Corrected.",
    "motivation": "editing"
  }]
}
```


CONCLUSION



- ▶ Extensions to existing formats
- ▶ Other formats for HTML, BDR, ...

RDFA

 `<body vocab="http://purl.org/dc/terms/">` 

 `<div resource="http://lib.com/books/0684853949">`

 `<h2 property="title">The Man Who Mistook His`
`Wife For a Hat</h2>`

 `<h3 property="creator">Oliver Sacks</h3>` 

...

RDFA : DE NOUVEAUX ATTRIBUTS POUR LES BALISES HTML

▶ RDFa light

vocab: default vocabulary for a section

prefix: declare other vocabularies

resource: identify a resource

typeof: type a resource using current voc

property: link to a value or a resource

RDFa core

content: provide a specific value

datatype: to type values

about: change the subject of a property

Cf MOOC web sémantique et web de données

<https://www.fun-mooc.fr/courses/inria/41002S02/session02/about>

TEXTE

(...)

```
<body vocab="http://purl.org/dc/terms/">
  <div resource="/books/web_semantique">
    <h2 property="title" lang="en">A Web of linked data</h2>
    <p>Date: <span property="created">2012-05-01</span>
    <span property="creator" resource="#fg">by</span></p>
  </div>
  <div vocab="http://xmlns.com/foaf/0.1/" resource="#fg" typeof="Person">
    <p> <span property="name">Fabien Gandon</span>,
    phone: <a property="phone" href="tel:+33492965170">+33492965170</a>
    mail: <a property="mbox"
      href="mailto:fabien.gandon@inria.fr">fabien.gandon@inria.fr</a></p>
  </div>
```

Propriétés vers
d'autres ressources



(...)

Cf MOOC web sémantique et web de données

<https://www.fun-mooc.fr/courses/inria/41002S02/session02/about>

HTML+RDFa Content

```
(...) <body vocab="http://purl.org/dc/terms/">
<body vocab= <div resource="/books/web_semantique">
  <div resour <h2 property="title" lang="en">A Web of linked data</h2>
    <h2 proper <p>Date: <span property="created">2012-05-01</span>
    <p>Date: < <span property="creator" resource="#fg">by</span></p>
    <span prop </div>
  </div>
  <div vocab="http://xmlns.com/foaf/0.1/" resource="#fg" typeof="Person">
  <div vocab= <p> <span property="name">Fabien Gandon</span>,
    <p> <span phone: <a property="phone" href="tel:+33492965170">+33492965170</a>
      phone: mail: <a property="mbox"
        mail: < href="mailto:fabien.gandon@inria.fr">fabien.gandon@inria.fr</a></p>
  </div>
</div>
```

```
(...) (...)
@prefix ns1: <http://purl.org/dc/terms/> .
@prefix ns2: <http://xmlns.com/foaf/0.1/> .

</books/web_semantique>
  ns1:title "A Web of linked data"@en ;
  ns1:created "2012-05-01" ;
  ns1:creator <#fg> .

<#fg> a ns2:Person;
  ns2:mbox <mailto:fabien.gandon@inria.fr>;
  ns2:name "Fabien Gandon" ;
  ns2:phone <tel:+33492965170> .
```

