Microdata and schema.org

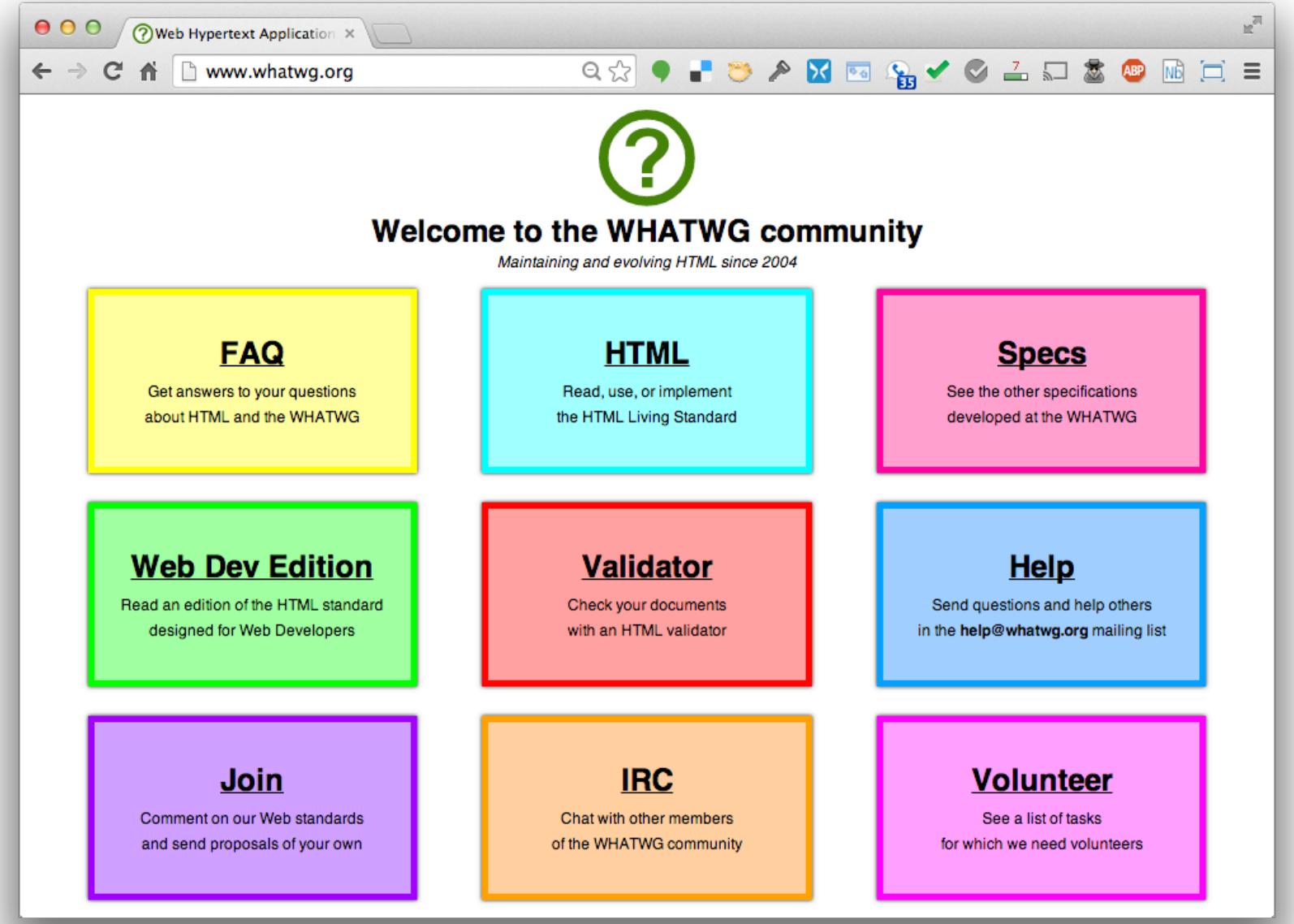
Basics

- Microdata is a simple semantic markup scheme that's an alternative to RDFa
- Developed by WHATWG and supported by major search companies (Google, Microsoft, Yahoo, Yandex)
- Like RDFa, it uses HTML tag attributes to host metadata
- Vocabularies are controlled and hosted at schema.org

What is WHATWG?

- Web Hypertext Application Technology Working Group
  - Community interested in evolving the Web with focus on HTML and Web API development
  - Ian Hickson is a key person, now at Google
- Founded in 2004 by individuals from Apple, Mozilla and Opera after a W3C workshop
  - Concern about W3C's embrace of XHTML
- Current work on HTML5
- Developed Microdata spec

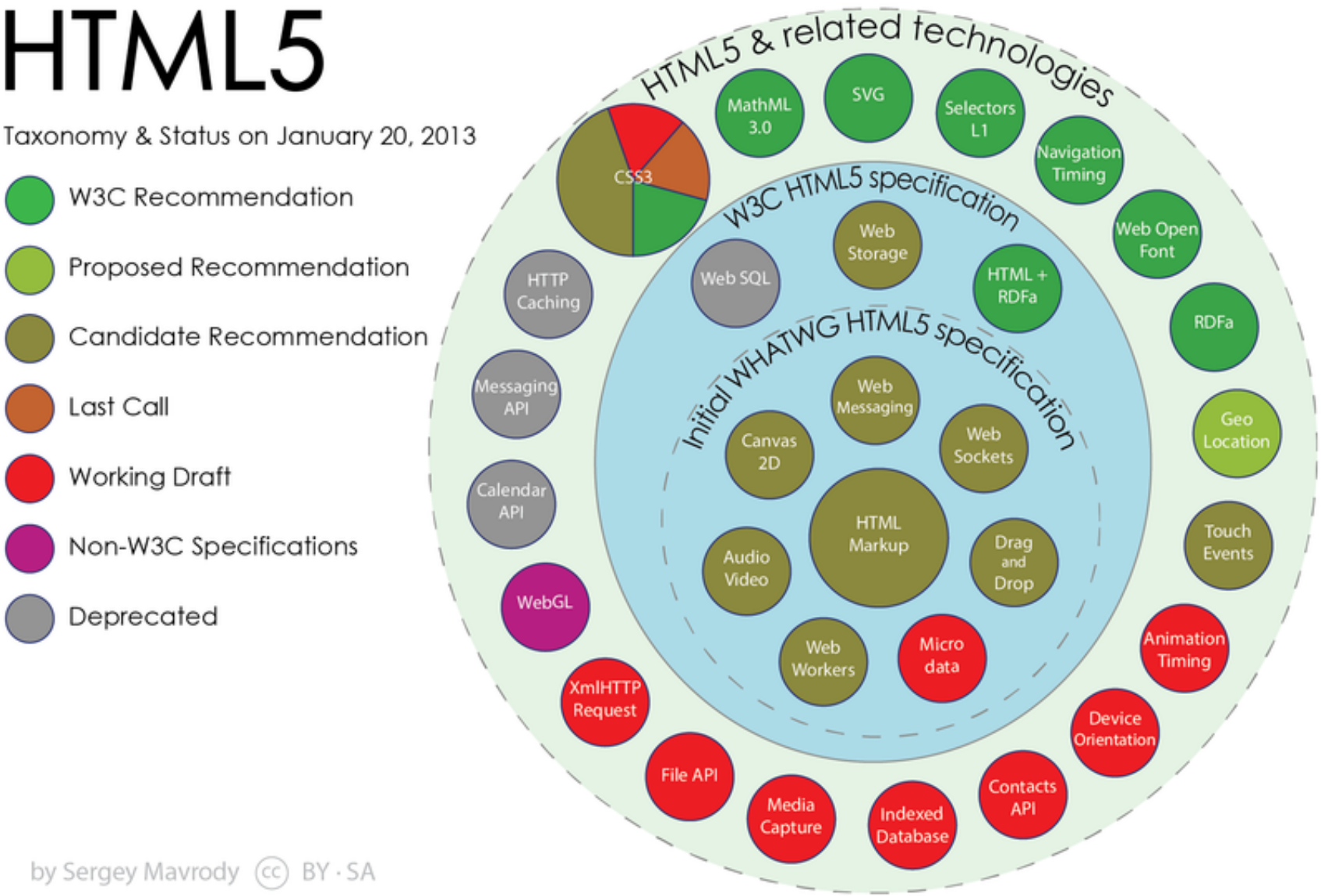
http://whatwg.org/



HTML5

- Started by WHATWG as an alternative to XHTML, joined by W3C
  - A W3C candidate recommendation in 2012 (draft)
  - WHATWG will evolve it as a “living standard”
- HTML5 ≈ HTML + CSS + js
- Native support for graphics, video, audio, speech, semantic markup, …
- Current partial support in major browsers & extensions

HTML taxonomy and status



Microdata

- The microdata effort has two parts:
  - A markup scheme
  - A set of vocabularies/ontologies
- The markup is similar to RDFa in providing ways to identify subjects, types, properties & objects

  There's also a standard way to encode microdata as RDFa
- The sanctioned vocabularies are found at schema.org and include a small number of very useful ones: people, movies, etc.

An example

```
<div>
 <h1>Avatar</h1>
 <span>Director: James Cameron (born 1954) </span>
 <span>Science fiction</span>
 <a href=”avatar-trailer.html">Trailer</a>
</div>
```

An example: itemscope

- An *itemscope* attribute identifies a content *subtree* that is the subject about which we want to say something

```
<div itemscope >
  <h1>Avatar</h1>
  <span>Director: James Cameron (born 1954) </span>
  <span>Science fiction</span>
  <a href=”avatar-trailer.html">Trailer</a>
</div>
```

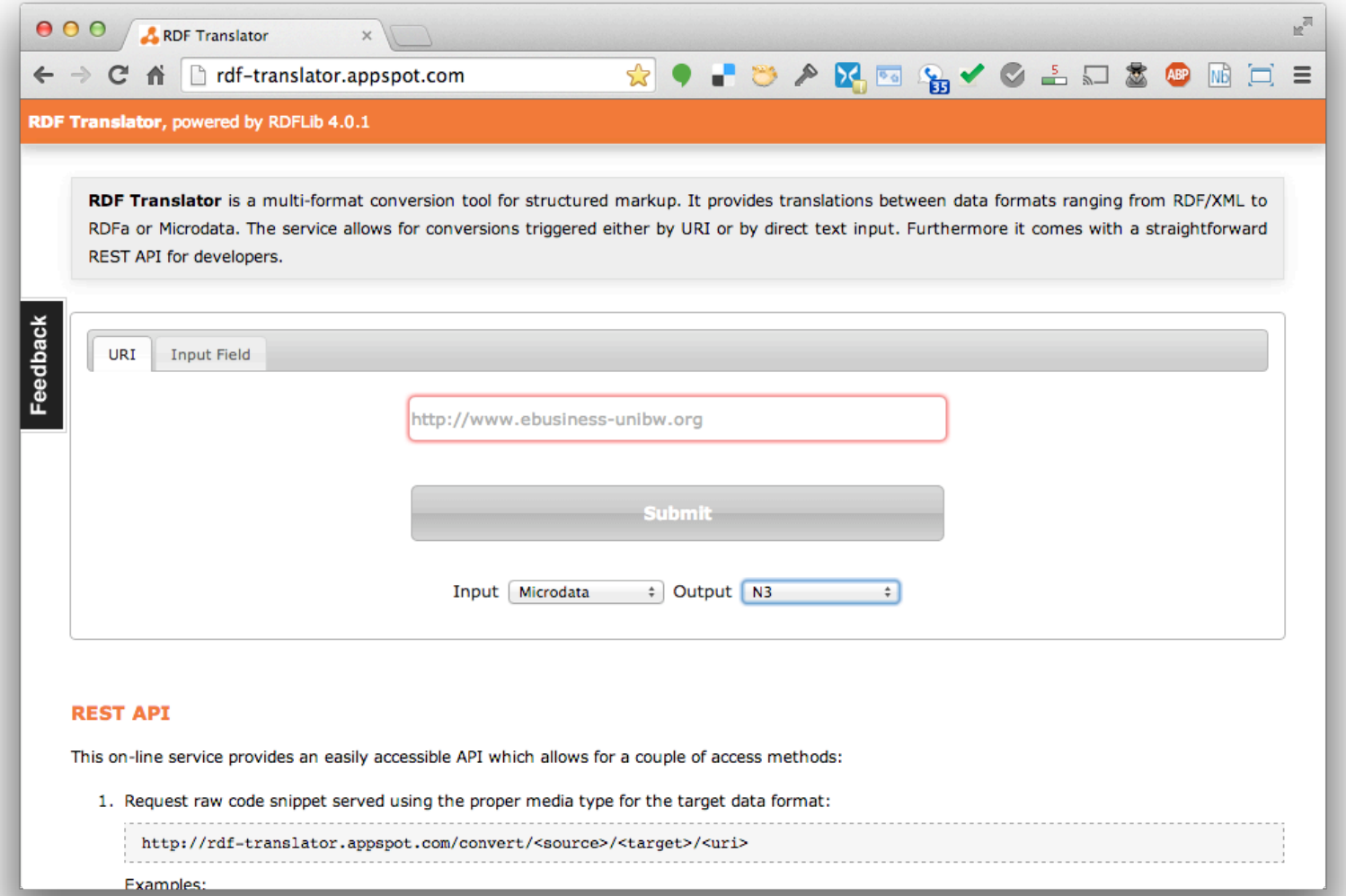
An example: itemtype

- An *itemscope* attribute identifies a content *subtree* that is the subject about which we want to say something
- The *itemtype* attribute specifies the subject's type

```
<div itemscope itemtype="http://schema.org/Movie">
  <h1>Avatar</h1>
  <span>Director: James Cameron (born 1954) </span>
  <span>Science fiction</span>
  <a href="avatar-trailer.html">Trailer</a>
</div>
```

Microdata <-> RDF

http://rdf-translator.appspot.com/



Microdata <-> RDF

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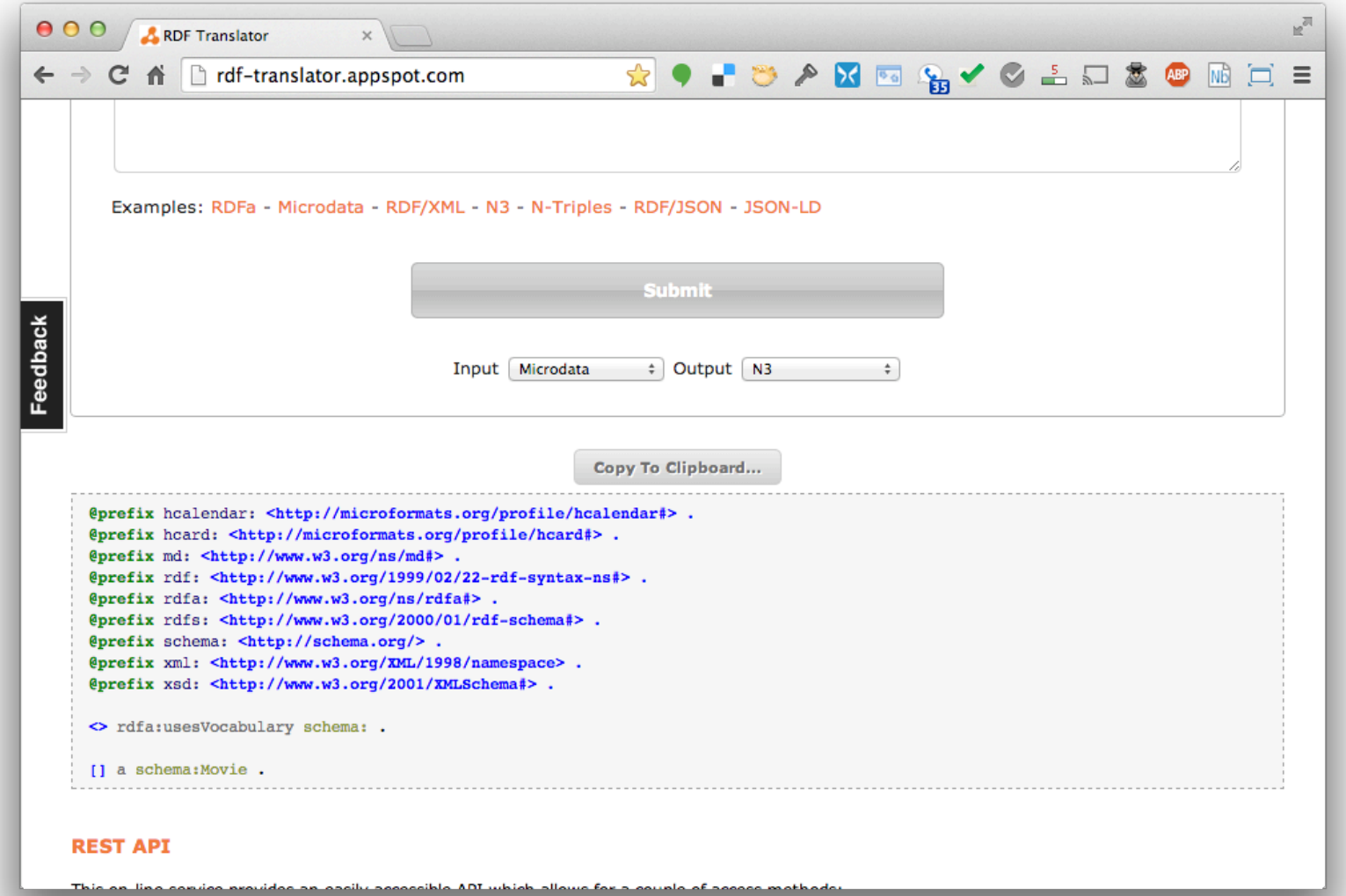

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[ ] a schema:Movie .

```
<div itemscope itemtype="http://schema.org/Movie">
  <h1>Avatar</h1>
  <span>Director: James Cameron (born 1954) </span>
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  <a href="avatar-trailer.html">Trailer</a>
</div>
```

An example: itemprop

- An *itemscope* attribute identifies a content *subtree* that is the subject about which we want to say something
- The *itemtype* attribute specifies the subject's type
- An *itemprop* attribute gives a property of that type

```
<div itemscope itemtype="http://schema.org/Movie">
  <h1 itemprop="name">Avatar</h1>
  <span>Director: James Cameron (born 1954) </span>
  <span itemprop="genre">Science fiction</span>
  <a href="avatar-trailer.html" itemprop="trailer">Trailer</a>
</div>
```

An example: itemprop

- An *itemscope* attribute identifies a content *subtree* that is the subject about which we want to say something
- The *itemtype* attribute specifies the subject's type
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```
[ ] a schema:Movie ;
    schema:genre "Science fiction" ;
    schema:name "Avatar" ;
    schema:trailer <avatar-trailer.html> .
```

```
<div itemscope itemtype="http://schema.org/Movie">
  <h1 itemprop="name">Avatar</h1>
  <span>Director: James Cameron (born 1954) </span>
  <span itemprop="genre">Science fiction</span>
  <a href="avatar-trailer.html" itemprop="trailer">Trailer</a>
</div>
```

An example: embedded items

- An itemprop immediately followed by another itemcope makes the value an object

```
<div itemscope itemtype="http://schema.org/Movie">
 <h1 itemprop="name">Avatar</h1>
   <div itemprop="director"
        itemscope itemtype="http://schema.org/Person">
     Director: <span itemprop="name">James Cameron</span>
     (born  <span itemprop="birthDate">1954</span>)
  </div>
 <span itemprop="genre">Science fiction</span>
 <a href="avatar-trailer.html" itemprop="trailer">Trailer</a>
</div>
```

An example: embedded items

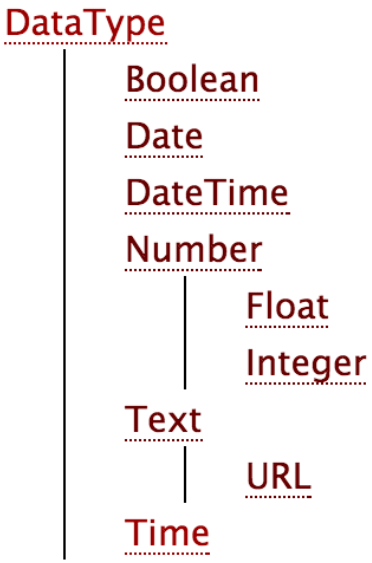
- An itemprop immediately followed by another itemscope makes the value an object

```
[ ] a schema:Movie ;
    schema:director [ a schema:Person ;
          schema:birthDate "1954" ;
          schema:name "James Cameron" ] ;
    schema:genre "Science fiction" ;
    schema:name "Avatar" ;
    schema:trailer <avatar-trailer.html> .
```

```
<div itemscope itemtype="http://schema.org/Movie">
 <h1 itemprop="name">Avatar</h1>
   <div itemprop="director"
        itemscope itemtype="http://schema.org/Person">
     Director: <span itemprop="name">James Cameron</span>
     (born  <span itemprop="birthDate">1954</span>)
  </div>
 <span itemprop="genre">Science fiction</span>
 <a href="avatar-trailer.html" itemprop="trailer">Trailer</a>
</div>
```

schema.org vocabulary

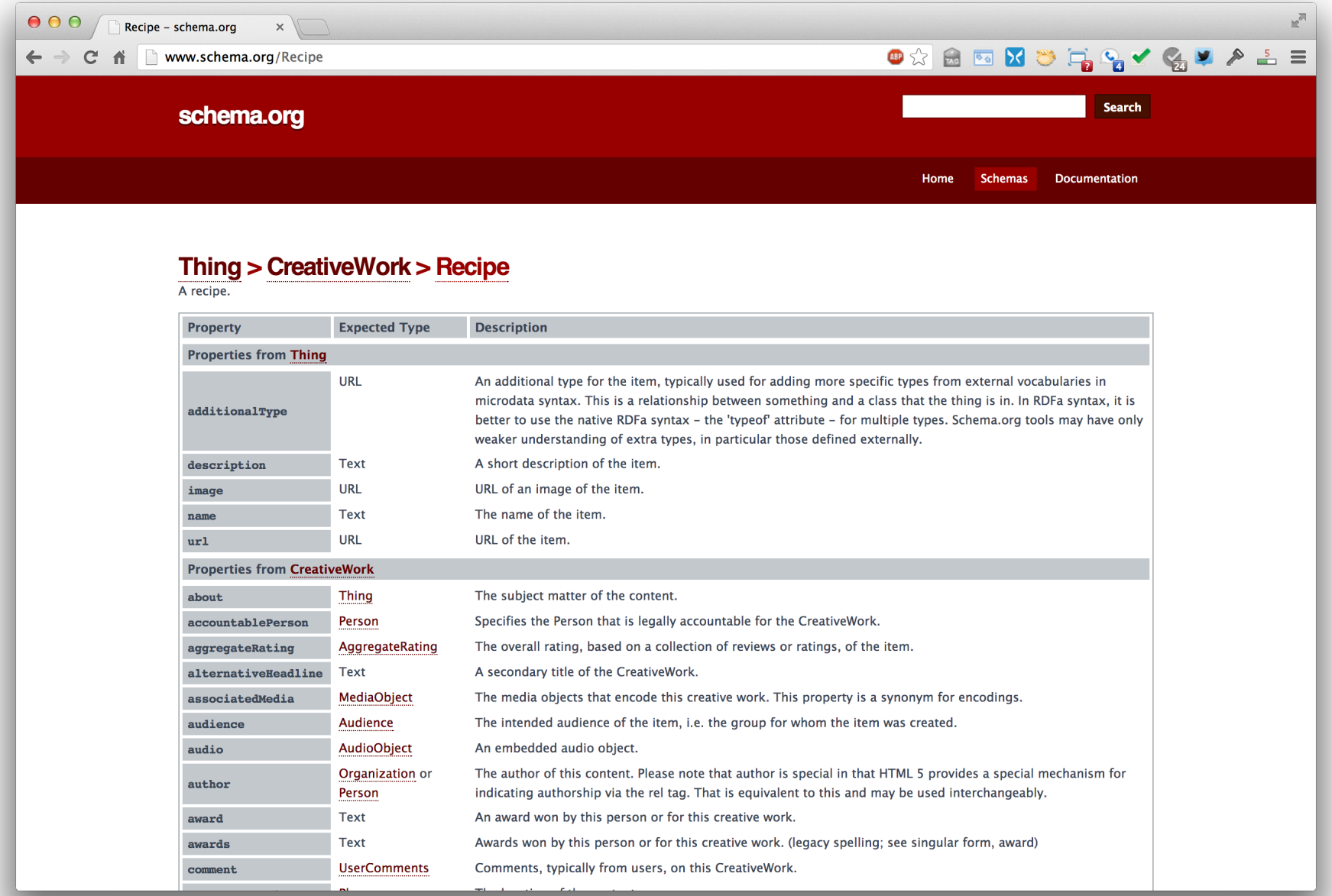
- Full type hierarchy in one file
- 548 classes, 711 properties (5/4/14)
- **Data types:** Boolean, Date, DateTime, Number (Float, Integer) Text (URL), Time
- **Objects:** Rooted at Thing with two 'metaclasses' (Class and Property) and eight subclasses



More specific types

- Class
- CreativeWork
- Event
- Intangible
- MedicalEntity
- Organization
- Person
- Place
- Product
- Property

http://www.schema.org/Recipe



Thing > CreativeWork > Recipe

A recipe.

Property	Expected Type	Description
Properties from Thing		
additionalType	URL	An additional type for the item, typically used for adding more specific types from external vocabularies in microdata syntax. This is a relationship between something and a class that the thing is in. In RDFa syntax, it is better to use the native RDFa syntax – the 'typeof' attribute – for multiple types. Schema.org tools may have only weaker understanding of extra types, in particular those defined externally.
description	Text	A short description of the item.
image	URL	URL of an image of the item.
name	Text	The name of the item.
url	URL	URL of the item.
Properties from CreativeWork		
about	Thing	The subject matter of the content.
accountablePerson	Person	Specifies the Person that is legally accountable for the CreativeWork.
aggregateRating	AggregateRating	The overall rating, based on a collection of reviews or ratings, of the item.
alternativeHeadline	Text	A secondary title of the CreativeWork.
associatedMedia	MediaObject	The media objects that encode this creative work. This property is a synonym for encodings.
audience	Audience	The intended audience of the item, i.e. the group for whom the item was created.
audio	AudioObject	An embedded audio object.
author	Organization or Person	The author of this content. Please note that author is special in that HTML 5 provides a special mechanism for indicating authorship via the rel tag. That is equivalent to this and may be used interchangeably.
award	Text	An award won by this person or for this creative work.
awards	Text	Awards won by this person or for this creative work. (legacy spelling; see singular form, award)
comment	UserComments	Comments, typically from users, on this CreativeWork.

Microdata as a KR language

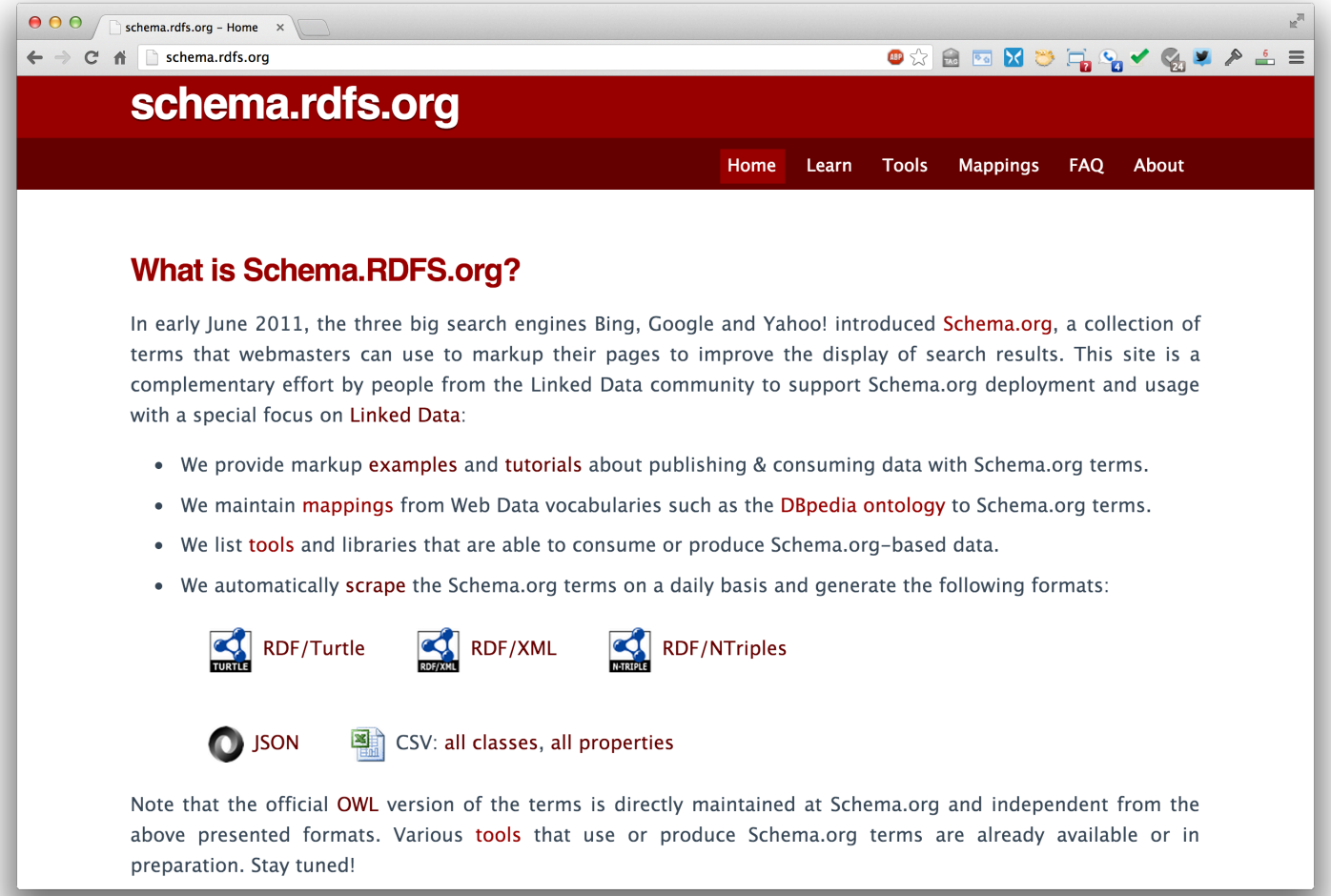
- More than RDF, less than RDFS
- Properties have an *expected* type (range)
  - Might be a string
  - A list of types, any of which are OK
- Properties attached ≥ 1 types (domain)
- Classes can have multiple parents and inherit (properties) from all of them
- No axioms (e.g., disjointness, cardinality, etc.)
- No subPropertyOf like relation

Mixing vocabularies

- Microdata is intended to work with just one vocabulary – the one at schema.org
- Advantages
  - Simple, organized, well designed
  - Controlled by the schema.org people
- Disadvantages: too simple, controlled
  - Too simple, narrow, mono-lingual
  - Controlled by the schema.org people
- Schema.rdfs.org defines mappings between schema.org and popular RDF ontologies

Schema <-> RDF

http://schema.rdf.org



Extending the schema.org ontology

- http://www.schema.org/docs/extension.html
- You can subclass existing classes
  - Person/Engineer
  - Person/Engineer/ElectricalEngineer
- Subclass exisiting properties
  - musicGroupMember/leadVocalist
  - musicGroupMember/leadGuitar1
  - musicGroupMember/leadGuitar2

Extension Problems

- Do agreed upon meaning
  - Through axioms supported by the language (e.g., equivalence, disjointness, etc.)
  - No place for documentation (annotations, labels, comments)
- Without a namespace mechanism, your Person/Engineer and mine can be confused and might mean different things

Serialization

- Schema.org has a data model and serializations
  - Microdata is the original, native sterilization
  - RDFa is more expressive and works with the RDF stack
  - Everyone agrees that *RDFa Lite* is a good encoding: as simple as Microdata but more expressive
  - JSON-LD is also an accepted encoding
- Search engines look for Microdata and RDFa encodings and are beginning to look for JSON-LD
- Schema.org considers RDFa to be the "canonical machine representation of schema.org"

Conclusions

- Microdata is a good effort by the search companies to use a simple semantic language
- The semantics is pragmatic
  - e.g., expected types: A string is accepted where a thing is expected – “some data is better than none”
- The real value is in
  - the supported vocabularies and
  - their use by Search companies
- => Immediate motivation for using semantic markup