



Is Semantic Web Part of the Broadcasting Future?

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SEMANTIC WEB IN A NUTSHELL



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What's new beyond the concept?

- New models, properties, queries
 - Ontologies
- New languages
 - RDF (Resource Description Framework)
 - OWL (Ontology Web Language)
- New representation formats
 - XML, N3, n-Triples, turtle
- New tools
 - Editors, debugger, parsers/validators & 'reasoners', databases, search engines



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What's the current status?

- Specified since 2004 onwards
- A wide range of existing resources (e.g. medical data, foaf)
- A few attempts to provide descriptions of audiovisual content
 - Description of programmes (RDF statements)
 - Classification of music (ontology), etc.
- Linking data more than developing automatic learning at this stage
- A collection of individual initiatives



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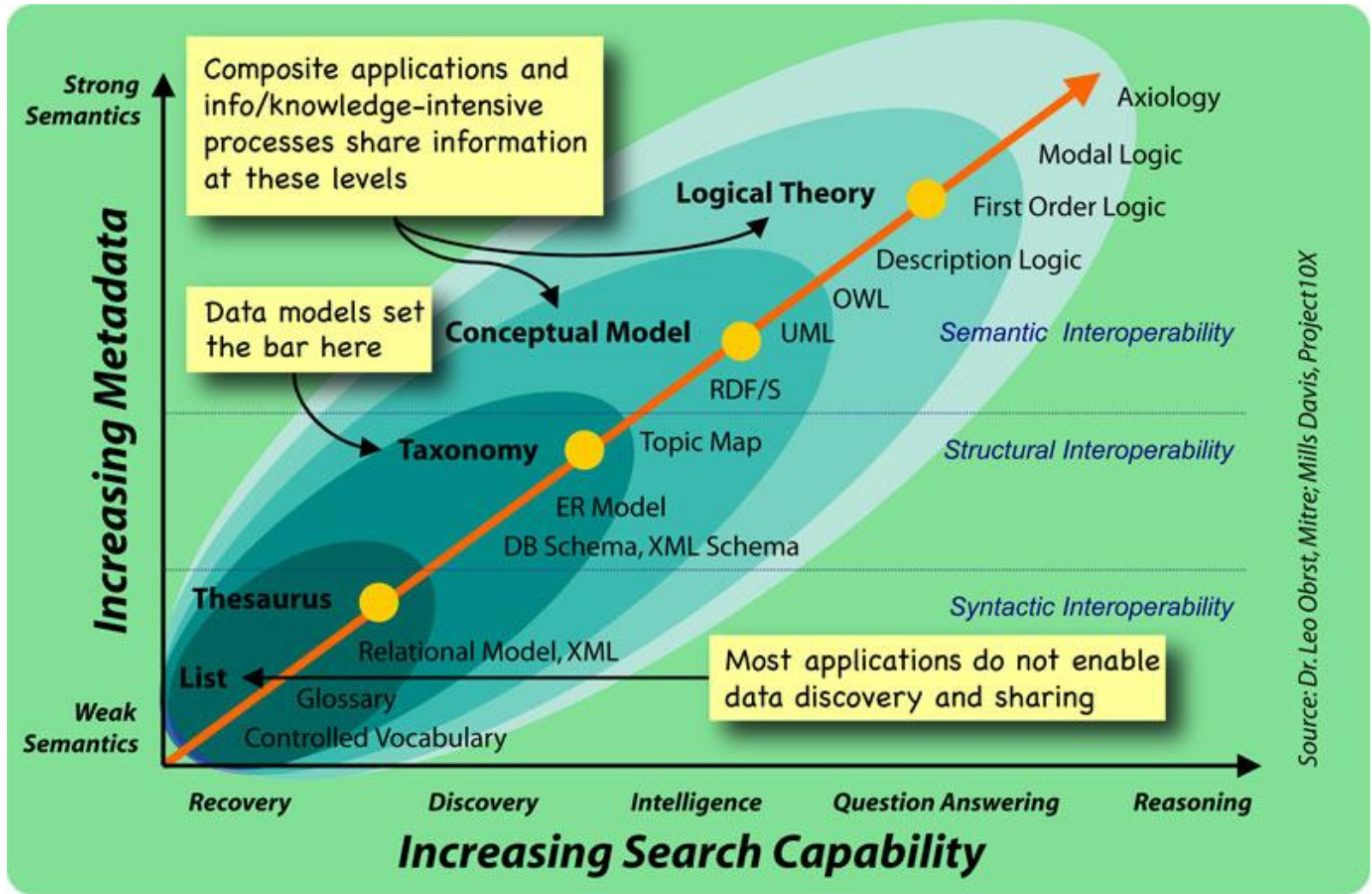


ONTOLOGIES: WHAT DO THEY BRING?



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Increasing search capability



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Courtesy Dr. L. Obrst (Mitre), M. Davis (Project10X)



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FIRST STEPS IN IMPLEMENTATION



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Important basic design considerations

- Ontologies “classes” are uniquely identified web resources
 - Most “business objects” in AV production are eligible as classes:
 - Groups of programmes, programmes, schedule, schedule event, organisations, persons are identified at least once in databases
- Transforming XML into RDF is not enough
- Mastering URIs and namespaces is required



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Simple in "principle" Example: classification

```
<skos:Concept rdf:about="EditorialFormatCodeCS.xml#2.1.2">  
  <rdf:type rdf:resource="&owl;Thing"/>  
  <skos:broader rdf:resource="EditorialFormatCodeCS.xml#2.1"/>  
</skos:Concept>
```

```
<skos:Concept rdf:about="ebu_EditorialFormatCodeCS.xml#2.1.2">  
  <rdf:type rdf:resource="&owl;Thing"/>  
  <skos:prefLabel xml:lang="en">Magazine</skos:prefLabel>  
  <skos:narrower rdf:resource="EditorialFormatCodeCS.xml#2.1.2.1"/>  
</skos:Concept>
```

```
<skos:Concept rdf:about="EditorialFormatCodeCS.xml#2.1.2">  
  <rdf:type rdf:resource="&owl;Thing"/>  
  <skos:narrower rdf:resource="EditorialFormatCodeCS.xml#2.1.2.2"/>  
</skos:Concept>
```

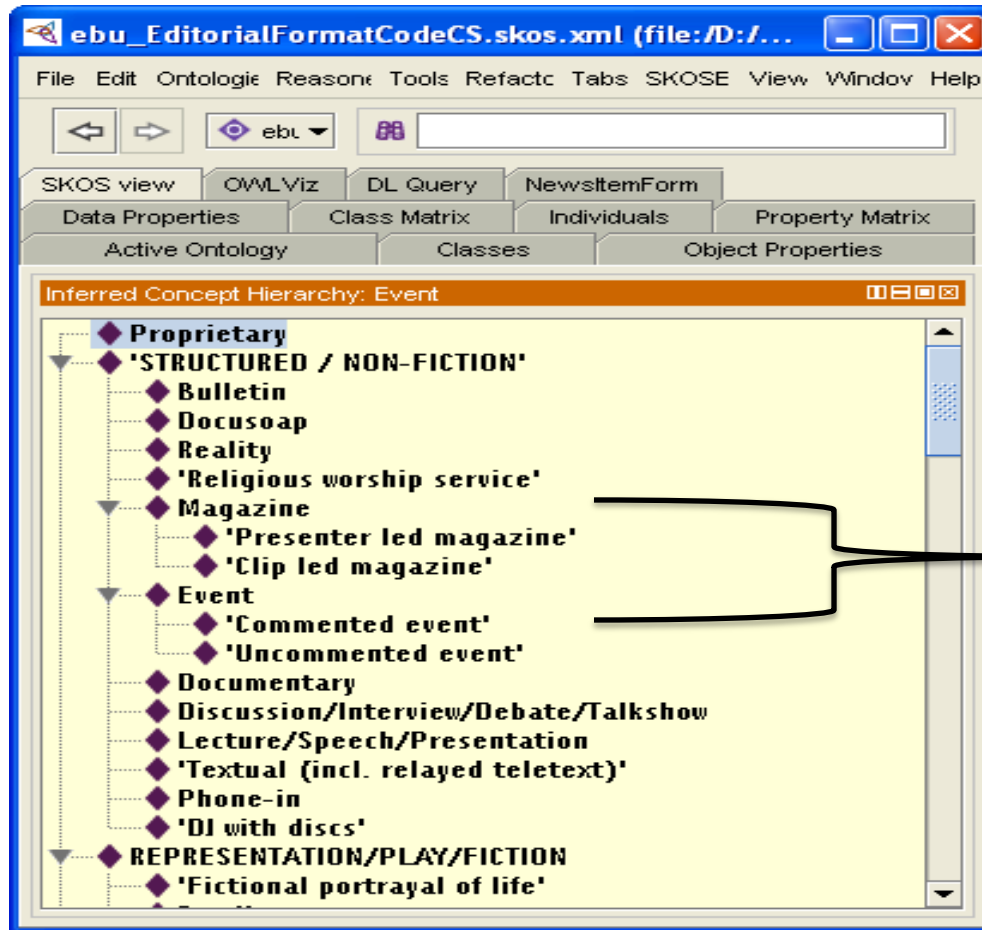
OR

```
<skos:Concept rdf:about="EditorialFormatCodeCS.xml#2.1.2">  
  <rdf:type rdf:resource="&owl;Thing"/>  
  <skos:prefLabel xml:lang="en">Magazine</skos:prefLabel>  
  <skos:broader rdf:resource="EditorialFormatCodeCS.xml#2.1"/>  
  <skos:narrower rdf:resource="EditorialFormatCodeCS.xml#2.1.2.1"/>  
  <skos:narrower rdf:resource="EditorialFormatCodeCS.xml#2.1.2.2"/>  
</skos:Concept>
```

Gives...



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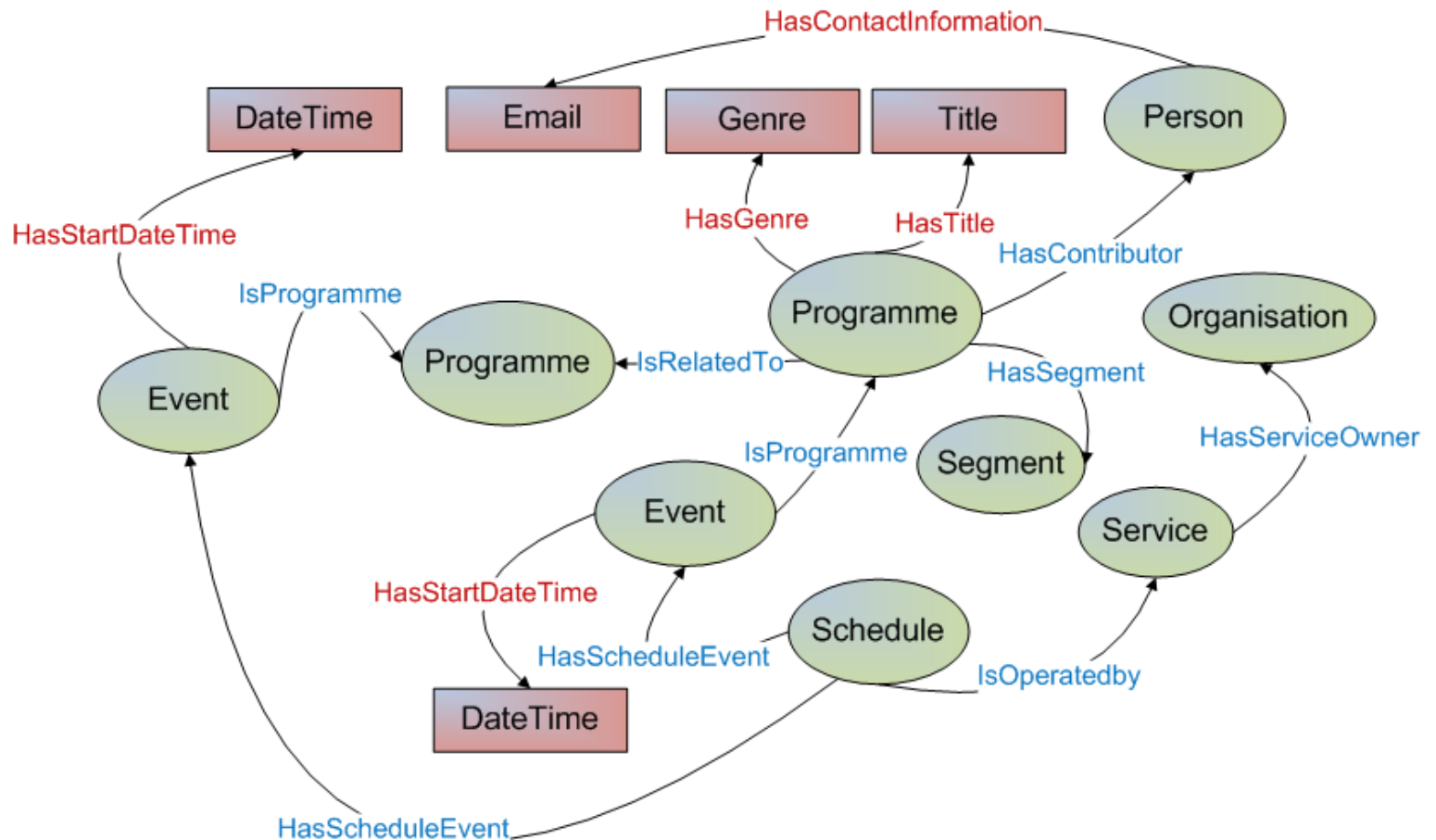


“Magazine”

SKOS Reasoning and Classification using Protégé (Stanford)

A series of RDF statements about each term and their respective position in the list allows a “reasoner” to re-construct the hierarchical classification

Going further... The EPG example





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The screenshot shows the Protégé interface with the following components:

- Active Ontology:** EBU_EPG.owl (http://www.ebu.ch/metadata/ontologies/EPG/EBU_EPG.owl)
- Individuals by inferred type: GroupeReservoir:**
 - CreditsItem (219)
 - Organisation (20)
 - Person (123)
 - Programme (48)
 - ProgrammeGroup (28)
 - Schedule (1)
 - 23-04-2009
 - ScheduleEvent (53)
 - 24143545813
 - 24143548813
 - 24143551813
 - 24143557813
 - 24143560813
 - 24143563813
 - 24143566813
 - 24143891813
 - 24147742813
 - 24147745813
 - 24147776813
 - 24147779813
 - 24147782813
 - 24147785813
 - 24147788813
 - 24147791813
 - 24147794813

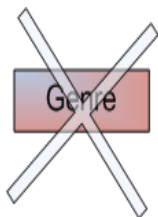
- Individuals by class: GroupeReservoir:**
- CreditsItem (219)
- Organisation (19)
 - BMC-GroupNW
 - BertSmetsProductions
 - CartoonSaloonLtd
 - FranceAnimation
 - FranceTelevisionDistribution
 - FremantleMediaLimited
 - Froggies
 - GroupeReservoir
 - Laboiteproductions
- Description: GroupeReservoir:**
- Types: Organisation, Thing
- Same individuals: (empty)
- Different individuals: Dely_Celine, 24143548813, 24147800813, Delarue_Jean-Luc, CI_08-TMIDA108-050-PR-2, PR_08-TCFFC354-000-PR, PR_08-TCQAD648-003-PR, Beretta_Barbara, PR_09-TI2T801-000-PR
- Property assertions: GroupeReservoir:**
- Object property assertions:
 - OrganisationRelatedCreditsItem CI_08-TCQAD648-153-PR-O
 - OrganisationRelatedCreditsItem CI_08-TCQAD648-003-PR-O
 - OrganisationRelatedCreditsItem CI_08-TCQAD648-152-PR-O
- Data property assertions:
 - OrganisationName "Groupe Reservoir"
- Negative object property assertions: (empty)

Another insight into reasoning

Using Protégé, inverse properties allow a “reasoner” to infer new knowledge like credits involved in broadcast programmes and related to the organisation “Groupe Reservoir”



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Change “genre” to an object property and easily connect to a classification scheme as a new linked resource using URIs

Query

```
PREFIX : <http://www.ebu.ch/metadata/ontologies/EPG/EBU_EPG.owl#>
SELECT DISTINCT ?pst ?pg ?pt
WHERE {
  ?se :ScheduleEventRelatedProgramme ?p.
  ?p :ProgrammeTitle ?pt.
  ?p :ProgrammeGenre ?pg.
  ?p :ProgrammeRelatedCreditsItem ?pci.
  ?pci :CreditsPerson ?cp.
  ?cp :PersonFamilyName ?pfn.
  ?se :ScheduleEventPublishedStartTime ?pst
  FILTER (?pst > "10:00:00")
  FILTER (?pst < "23:00:00")
  ORDER BY ?pst
}
```

Execute Query

SPARQL

pst	pg	pt
10:05:00.00	Magazine	Hep Taxi ! - Brigitte Lahaie
10:05:00.00	Magazine	Hep Taxi ! Brigitte Lahaie - (En boucle)
10:35:00.00	Magazine	Zoom arriere - Les incroyants
11:37:00.00	Micro-programme	Questions d'argent - Carte de credit reserve
11:40:00.00	Serie	Plus belle la vie (Saison V)
12:05:00.00	Magazine	Toute une histoire
13:45:00.00	Documentaire	Superscience - Les hommes de l'espace
14:35:00.00	Magazine	Toute une histoire - Comment se pardonner une erreur de jeunesse ?
16:02:00.00	Jeunesse	Ici Bla Bla - Le kiosque extra-terrestre
16:02:00.00	http://www.ebu.ch/metadata/cs/ebu_ContentGenreCS.skos.owl#3.5	Ici Bla Bla - Le kiosque extra-terrestre
16:35:00.00	Jeunesse	Il etait une fois...Notre Terre - l'eau ne tombe pas du ciel
16:51:00.00	Jeunesse	La chouette - Course poursuite
17:16:00.00	Jeunesse	La chouette - La cigogne
17:17:00.00	Jeunesse	Ben 10 - Ambiance glaciale
17:40:00.00	Information	Les Niouzz
17:55:00.00	Magazine	Toute une histoire
19:00:00.00	Serie	Plus belle la vie (Saison V)
19:25:00.00	Serie	30 Rock (Saison I) - l'insulte

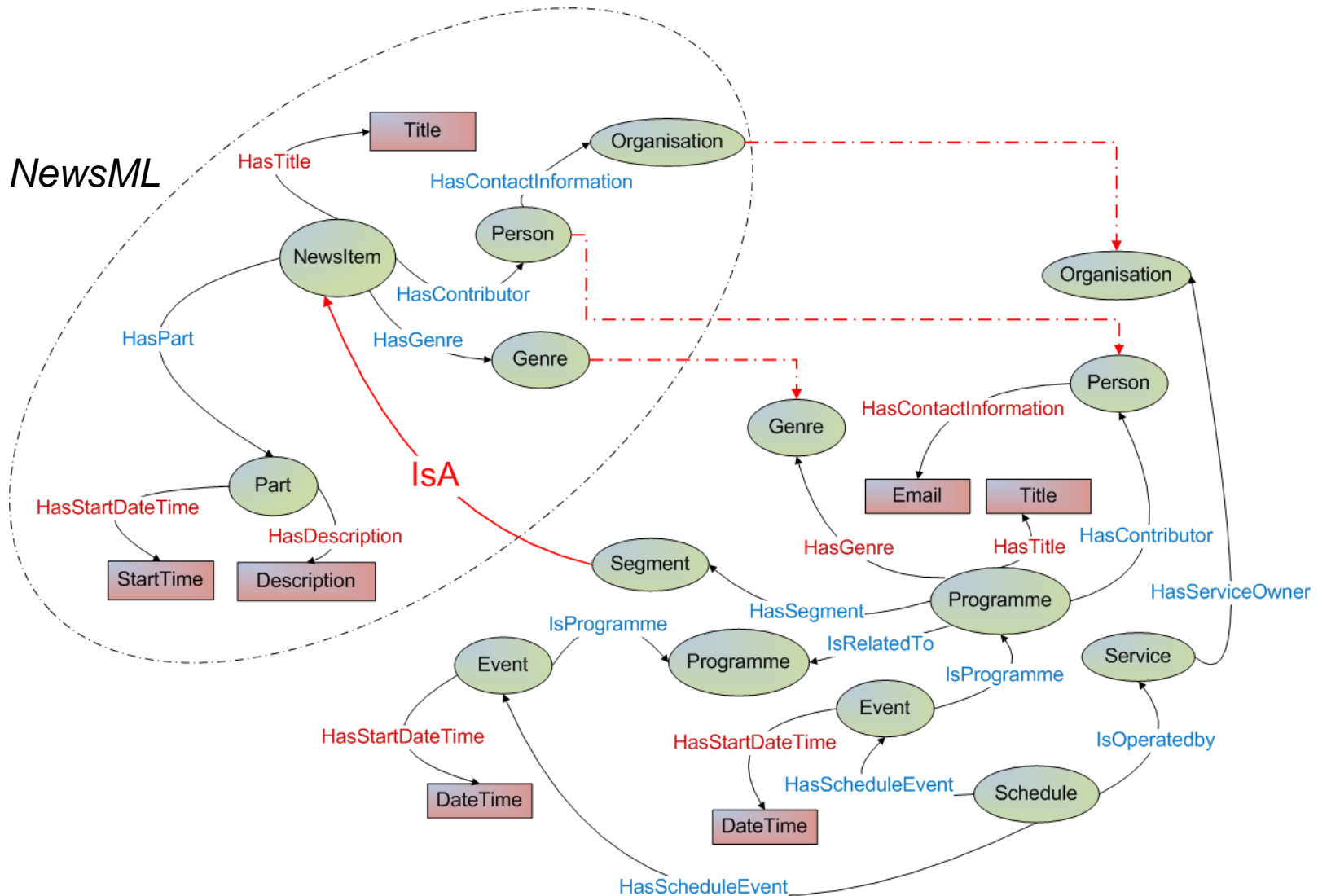
Looking for all programmes within a particular time window?
Use SPARQL.

Schedule XML data used for RDF/OWL transform: courtesy RTBF



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Combining ontologies: a "segment" is a "news item"





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In summary (1)

- Pros
 - Very intuitive and flexible
 - Modular
 - Easy multi-source collaborative metadata creation
 - Manage sensitive data
 - Allow external « tagging »
 - A good solution to link data and connect concepts
 - Bridging ontologies e.g. NewsML with the EPG
 - An elegant solution for classification schemes
 - Increasing search capabilities using existing resources
 - Metadata already exists



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In Summary (2)

- More work needed
 - Models need to be revisited
 - Tools are missing or incomplete and some basic datatypes (e.g. date & time) and are not fully supported
 - Versioning, updating needs more attention
 - More guidelines are necessary e.g. on where to store data to be harvested / crawled, identification (this is 'epg' like data), security, etc.
 - Search engines need further development
 - Ontologies and publication protocols need standardisation



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CONCLUSION

**SEMANTIC WEB IS PART
OF THE BROADCASTING
FUTURE**



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A direct access to users via Internet

Internet and search engines are starving for reliable focused information on programmes and services

This information is an asset of the content and service providers...

...who should develop portals or collaborate e.g. with search engines to guide users



SearchVoD

SearchTV





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http://tech.ebu.ch/semanticweb_ebu

THANK-YOU!