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# SEMANTIC WEB LANGUAGES – STRENGTHS AND WEAKNESS

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# Agenda

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- Focus
- Aim
- Comparison
  - Modeling primitives
  - Language-to-Language
- Strengths and Weakness

# Focus

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- Current WWW is a syntactic Web where structure of the content is presented while content itself is only readable by humans.
- Semantic Web → Next generation of Web aims to alleviate the problem by adding semantics to content.
- Semantic Web Languages make the Web machine-processable and machine-understandable.
- Powerful Ontology Languages are the most wanted thing to formalize the Web

# Aim

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- Comparison of various existing ontology languages:
  - XML(s)
  - RDF(s)
  - OIL
  - DAML+OIL
  - OWL
- Approach:
  - Modeling primitives comparison
  - Language-to-Language evaluation. W3C Wish list

# Comparison – Modeling primitives

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- **Factual knowledge: Data Models**
  - XML labeled trees → basic data model
  - RDF (resource, property, statement) → syntax neutral, reification
  - OIL, DAML+OIL and OWL are DL and FL based → rich property, class and axioms to model the world
- **Terminological Knowledge: Ontologies**
  - XML → document and content structure definition, inheritance for elements and attributes, creation of user-defined data types.
  - RDF → directly used to define ontologies, limited expressiveness
  - OIL, DAML+OIL and OWL complete support for defining ontologies, richer constructs, layered.
- **Inference Knowledge**
  - XML → XSLT allows XML transformations which can be use to express certain inferential transformations
  - RDF → subclass can be used to express subsumption
  - OIL, DAML+OIL and OWL → definition of complex rules or axioms

# Comparison – Modeling primitives

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	Facts	Terminology	Inference
<b>XML</b>	+	+/-	-
<b>RDF(S)</b>	+	+/-	-
<b>OIL</b>	++	++	++
<b>DAML+OIL</b>	++	++	++
<b>OWL</b>	++	++	++

# Comparison – Language-to-Language

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## – XML vs RDF.

- RDF is an application of XML.
- RDF has fixed set of primitives plus standard way to represent metadata while XML use results in different syntaxes.

## – XMLs vs RDFs.

- RDFs allows basic definition of ontologies while XMLs does not, plus information on interpretation statements.
- XMLs prescribes order and combination of tags.

## – XMLs vs OIL.

- Main common goal to provide vocabulary and structure for exchanging information sources.
- OIL much richer modeling primitives (slots + classes). XMLs richer built in data types and grammar for structuring the content of elements

# Comparison – Language-to-Language

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## – **RDFs vs OIL.**

- RDFs can be used as representation format of OIL.
- OIL uses RDFs primitives.
- Valid OIL document is a valid RDFs document

## – **RDFs vs DAML+OIL.**

- Tight integration of both by using RDFs to express syntax in DAML+OIL.
- Informal prohibition over cardinality to make DAML+OIL decidable.

## – **DAML+OIL vs OWL.**

- Rather trivial difference. DAML+OIL major reference for OWL specification.
- OWL abstract syntax reverted to grouping axioms into frame like structures easing the use of Frame based tools (Protégé) or DL based tools (OilEd).
- OWL is closer to OIL (frame based feature), while DAML+OIL is more DL-like

# Strength and Weakness

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## – RDF(s).

- Definition of mapping rules
- Weak reasoning capabilities only suitable for constraint checking
- Limited expressive power
- Many tools and examples available
- Support for different natural languages
- Community is active developing and improving

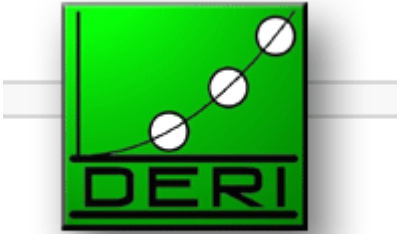
## - OIL.

- Much richer expressive power than RDF(s)
- Good reasoning, atomic consistency checking, cross linking of relations and implied relations checking
- Support for different natural languages
- Vast amount of documentation, tools and examples available
- Good compatibility, design based on DL, FL and Web Standards (RDFs and XML)

# Strength and Weakness

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- **DAML+OIL.**
  - Reasoning capabilities useful for ontology sharing
  - Partial definition of mapping rules
  - Specially suited for DL reasoning
  - Support for ontology design, maintenance and deploy
  - Much richer expressive power than its predecessors
  - Support for different natural languages
  - Supports full range of XML(s) datatypes
  
- **OWL**
  - Built-in versioning facilities
  - Same reasoning mechanisms as DAML+OIL based on OWA.
  - Rich expressive power
  - Layer architecture for scalability
  - Support for different natural languages
  - Based on OIL and DAML+OIL and thus compatible
  - Still under development



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<Q&A>