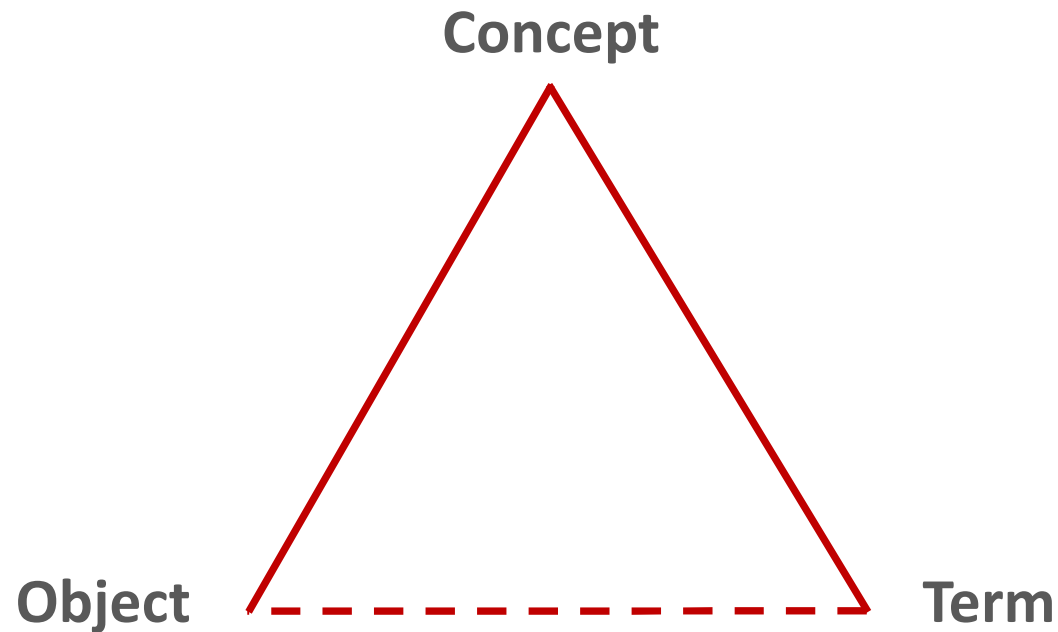


# ASAM OpenX Ontology

What is an ontology  
Ulrike Parson & Steven Kraines



## Concepts in a domain



## Concepts in a domain: Scooter

... type of motorcycle with a step-through frame and a platform for the rider's feet.

... a human-powered street vehicle with a handlebar, deck, and wheels propelled by a rider pushing off the ground.

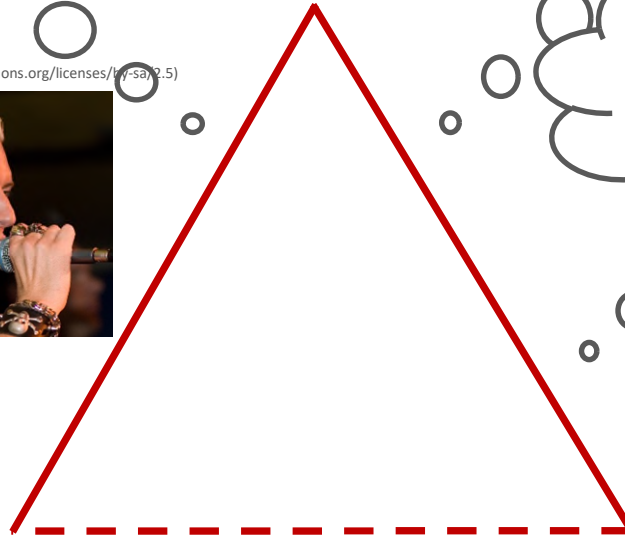
... a German dance and trance group

Radiat-r / CC BY-SA  
(<https://creativecommons.org/licenses/by-sa/2.5>)

By Шилин  
BY-SA 4.0,  
<https://commons.wikimedia.org/wiki/index.php?curid=778932>



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<https://commons.wikimedia.org/wiki/index.php?curid=778932>



„scooter“  
„motor scooter“

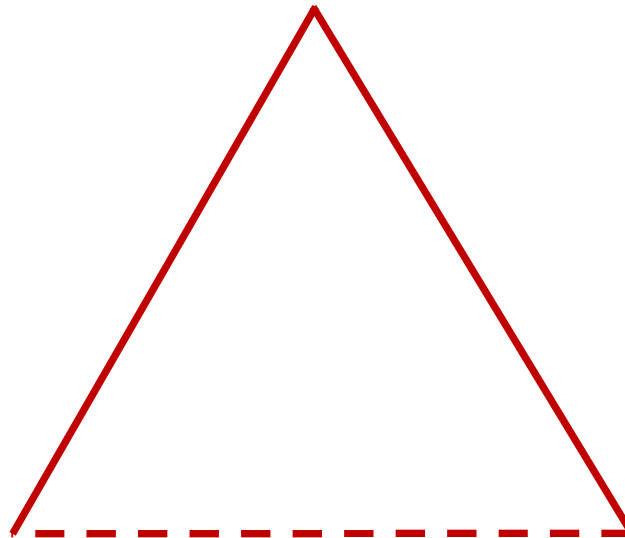
## Concepts in a domain

**Concept:** <https://www.wikidata.org/wiki/Q193234>

**Object**



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<https://commons.wikimedia.org/w/index.php?curid=778932>



**Term**

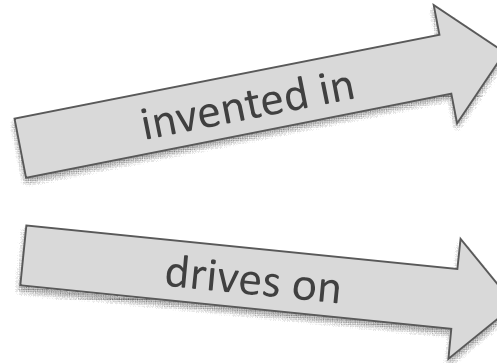
De: Motorroller  
En: Scooter (motorcycle)

# Properties and relations

<https://www.wikidata.org/wiki/Q193234>



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<https://commons.wikimedia.org/w/index.php?curid=778932>



<https://www.wikidata.org/wiki/Q38>



<https://www.wikidata.org/wiki/Q34442>

## Properties

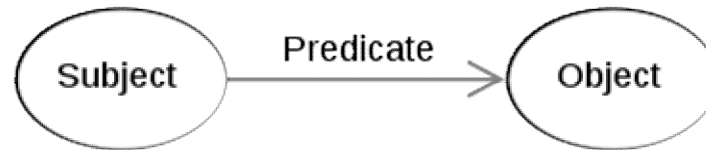
- 2 wheels
- Step-through frame
- Platform for feet
- Engine
- Seat

## Relations to other concepts

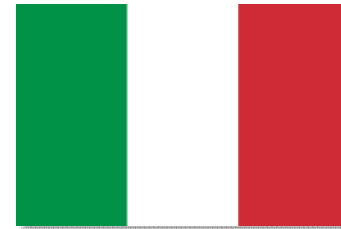
- Sovereign state,  
<https://www.wikidata.org/wiki/Q3624078>
- Road  
<https://www.wikidata.org/wiki/Q34442>

# Triples

Relations between objects create triples



<https://www.wikidata.org/wiki/Q193234>



<https://www.wikidata.org/wiki/Q38>

# Semantic network

Triples create a semantic network of information that is machine readable





## Benefits of ontologies

- Provide an explicit and unambiguous representation of the concepts and relations that are important in a domain of interest to a community of people.
- Provide a framework for a simplified and controlled language that can be used by members of the community to make statements and questions in the context of the domain
- Provide background knowledge of the domain in a form that a computer can use to understand statements that are made by members of the community using the controlled language.

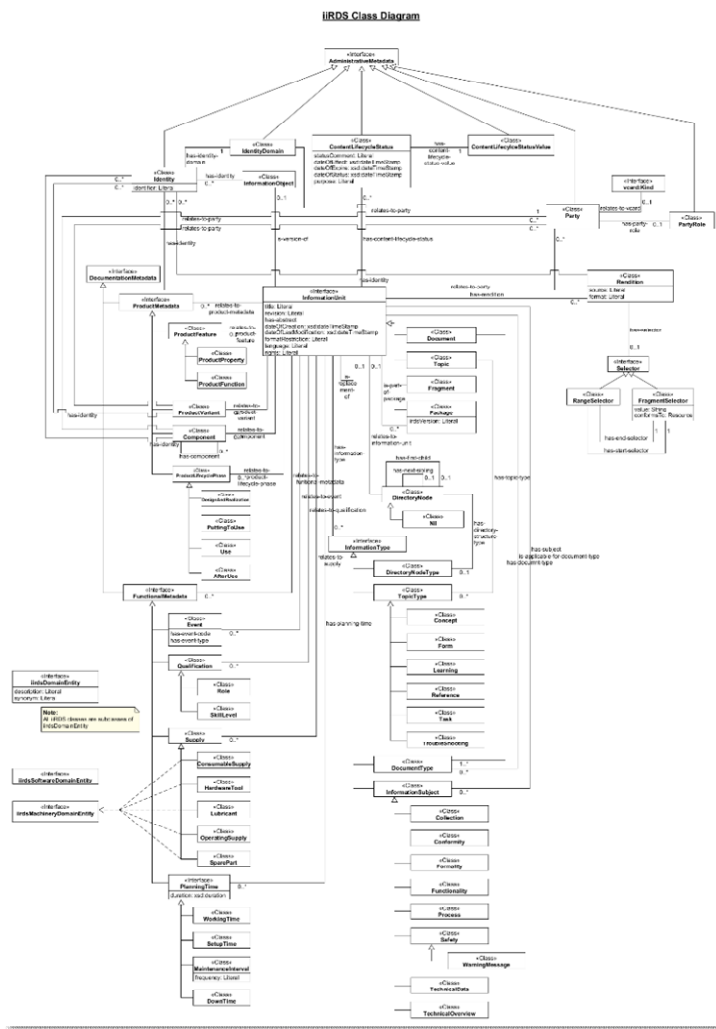
## Benefits of ontologies

- Provides basic axioms for:
  - Calculating semantic proximity: descriptions that mean the same thing even through they do not say the same thing
  - Use for classification, finding similar scenarios, etc.
  - Logic and rule-based reasoning to infer relationships implied in the expressions
    - Use for finding errors, assessing coverage, extracting common patterns
- Language-independent
- Basis for information/data exchange between systems and applications

## Ontologies = future

- 75% of the Fortune 500 companies have some kind of smart data or semantics program underway
  - 360° initiatives
  - comprehensive enterprise data systems
  - machine learning/data science projects
- Governments have all moved critical data resources into semantic form
- Gartner predicts that the application of graph processing and graph databases will grow at 100% annually over the next few years to accelerate data preparation and enable more complex and adaptive data science.  
(<https://www.gartner.com/smarterwithgartner/gartner-top-10-data-analytics-trends/> )

## Example: iiRDS



**iiRDS – intelligent  
information/documentation for the  
connected industry**

- Information types
- Information subjects
- Product lifecycle phases
- Content lifecycle phases
- Qualification
- Skills
- Roles
- ...

<https://iirds.org/>

# Example iiRDS: Semantic search

parson

we create knowledge

mount rotor

key-user

(4)

(1)

Language

English	34	
German	34	

Role

Operator	56	
Service technician	54	

Life cycle

Assembly	2	
Cleaning	2	
Fault	10	
Maintenance	4	
Phase of product lifecycle	16	
Putting to use	2	
Use	14	

Product variant

T3-B	8	
T3-H1	12	
T5-B	8	
T5-DH1	10	
T5-DH2	10	
TP-B	8	

Mounting the rotor

... : **Mounting** the **rotor** Push the fastening screw 4 .... The **rotor** is now **mounted** ... 4 : **Rotor mounted** ...

Language: English

Mounting the rotor

... 2: **Mounting** the **rotor** ... screw 4 into the screw fitting 3 and tighten them hand tight with a crosshead screwdriver. The **rotor** is now **mounted** ... 4: **Rotor mounted** You have now finished **mounting** ...

Language: English

Cleaning the rotor

... If the impeller of the **rotor** is dirty, you can clean it as follows. Disconnect the device from the mains. Remove the safety grille. Clean the **rotor** with a damp cloth. **Mount** the safety grille. Place the device back upright. Connect the device to the mains (see section Getting started). → The **rotor** is now cleaned and the device is ready ...

Language: English

Mounting the telescopic rod and base plate

... : **Mounting** the base Fix the adjustment screw 1 onto the telescopic rod 2 as shown ... Take the functional unit 5, on which you have already installed the **rotor** and the safety grille, and push it onto ... unit is now **mounted** on the telescopic rod ...

Language: English

## Example iiRDS: Semantic search

Another content delivery portal, same functionality thanks to iiRDS being a standard

The screenshot displays the EMPOLIS INFORMATION MANAGEMENT portal interface. The top navigation bar includes 'Overview', 'Search' (active), and 'Bookmarks'. On the right, there are icons for a profile, help, settings, and a user icon. The left sidebar contains a 'Filter' section with the following categories and counts:

- Filter** (2 items):
  - ☐ Maintenance instructions (2)
  - ☒ Operating instructions (2)
  - ☐ Quick reference guide (2)
  - ☐ Repair instructions (2)
- Topic type** (2 items):
  - ☐ Task (2)
- Product life cycle phase** (2 items):
  - ☐ Putting to use (2)
  - ☒ Assembly (2)
- Subject** (2 items):
  - ☐ Use (6)
  - ☐ Functionality (2)

The main content area shows a search for 'Rotor' with 2 results. The search bar includes a 'Search for...' input, a 'Rotor' search term, and a search icon. Below the search bar, there are filters for 'Type', 'Date', and 'Language'. The results are displayed as a list of documents:

- Mounting the rotor** (01/14/2020 • English): Mounting the **rotor** CAUTION: Small children or pets may swallow ... **Rotor** mounted You have now finished mounting the **rotor** and ...
- Mounting the telescopic rod and base plate** (01/14/2020 • English): ... unit 5, on which you have already installed the **rotor** and the safety grille, and push it onto the telescopic ...

The interface also includes a 'Sort by Relevance' dropdown and a '2 results for' indicator. The bottom right corner features a blue circular button with a white icon.

# ASAM OpenX Ontology

How to write good user stories

## Good user stories



Copyright: strichfiguren.de, Fotolia

### What is a user story

- Describes requirements for a software, a solution, a system
- Written from the user's perspective
- Explains reason for feature requirement
- Basis for communication and further specification



## Good user stories







Copyright: strichfiguren.de, Fotolia

### Format

- As a <user role>
- I want to <do>, <have>, <use> something
- because / in order to

*As an AV/ADAS developer company, I want to search, review and reuse scenarios built by other companies, because we rely on specialized external suppliers for scenario data for our development activities.*

## Dos and Don'ts

- Do not specify the implementation or technical solution, just the requirement of the user
  -  As an ADAS developer, I want to integrate external scenario data as Java library
  -  As an ADAS developer, I want to integrate external scenario data directly in my programming environment to avoid switching tools during work.
- Do not forget the reason/motivation.
- Do not make the user story too large, e.g. by putting two requirements into one.
  -  As an ADAS developer, I want to integrate external scenario in my programming environment and immediately recognize it as external, so I am aware that this data can be overwritten at next import.
  -  As an ADAS developer, I want to use scenario data.

## INVEST criteria

A user story needs to fulfil these criteria:

**I**ndependent

**S**mall

**V**aluable

**N**egotiable

**T**estable

**E**stimatable

we create knowledge



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