



WIKIDATA

“The free knowledge base that anyone can edit”

Wikimania05/Paper-MK2

[< Wikimania05](#)

This page is part of the [Proceedings of Wikimania 2005](#), Frankfurt, Germany.

0 MISSING 1 Submitted 2 Editing 3 Author review 4 Final edit 5 DONE

Wikipedia and the Semantic Web - The Missing Links [\[edit\]](#)

- **Author(s):** Markus Krötzsch & Denny Vrandečić & Max Völkel
- **License:** CC-NC-SA 2.0 (for further license models, please contact the authors)
- **Slides:** collected but not uploaded yet
- **Video:** [16:44](#) (talk given by Denny Vrandečić)
- **Note:** Presentation, paper also at [Wikipedia and the Semantic Web](#) (PDF, 164K)

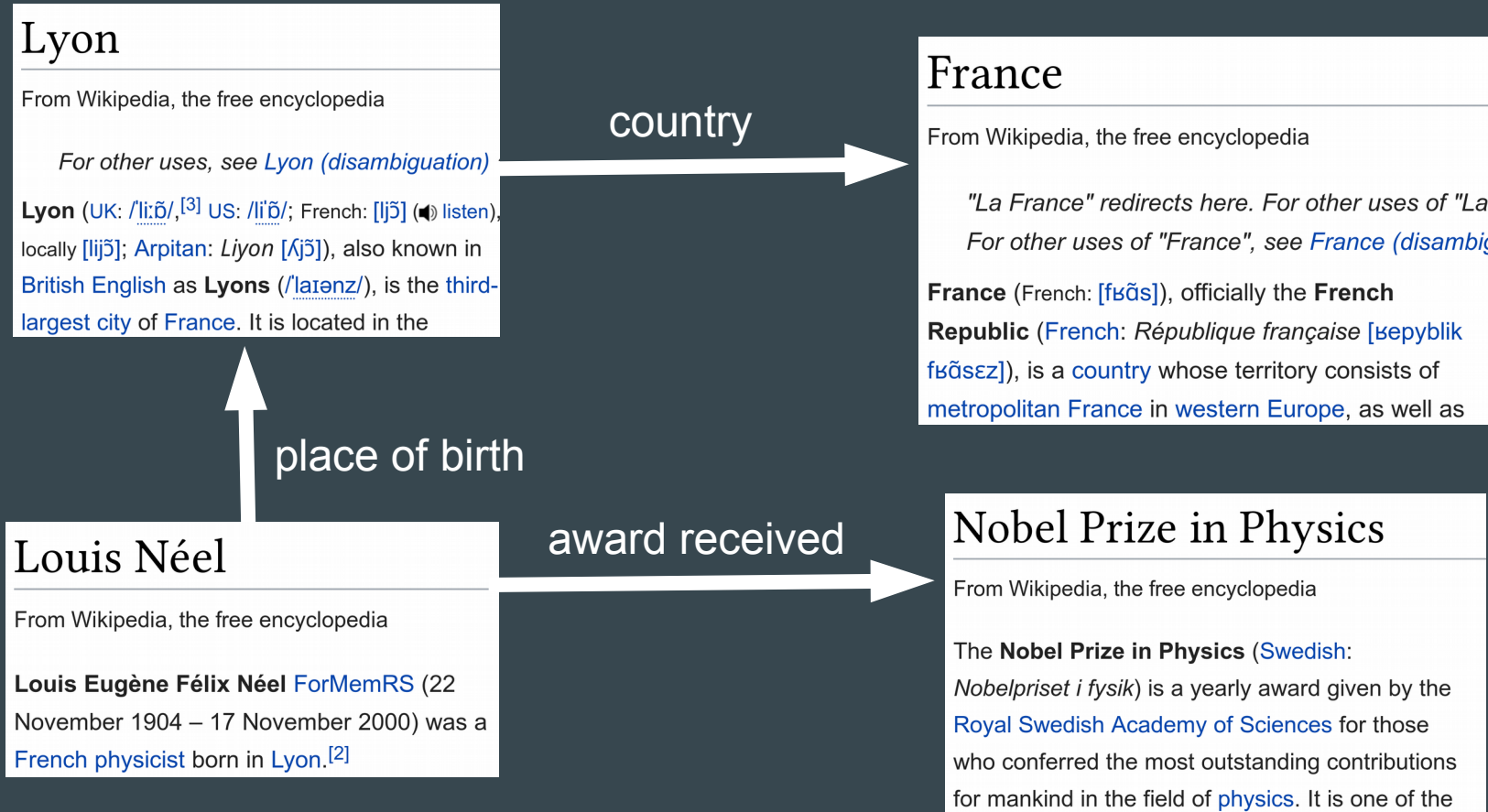
About the author: The authors are research associates at the *Institute of Applied Informatics and Formal Description Methods* (AIFB), [University of Karlsruhe](#), Germany, where they are members of the AIFB [Research Group Knowledge Management](#), an interdisciplinary team of computer scientists, mathematicians, and industrial engineers that is one of the world-wide leading institutions in the Semantic Web research community. Other relevant research topics include Semantic Web, ontologies, data and text mining, logic-based knowledge representation, peer-to-peer, and Web services.

Being enthusiastic users and contributors of various Wikis, the authors also have special interest in making emerging semantic technologies available within Wikis, where computer-assisted organization and processing of knowledge plays an important role.

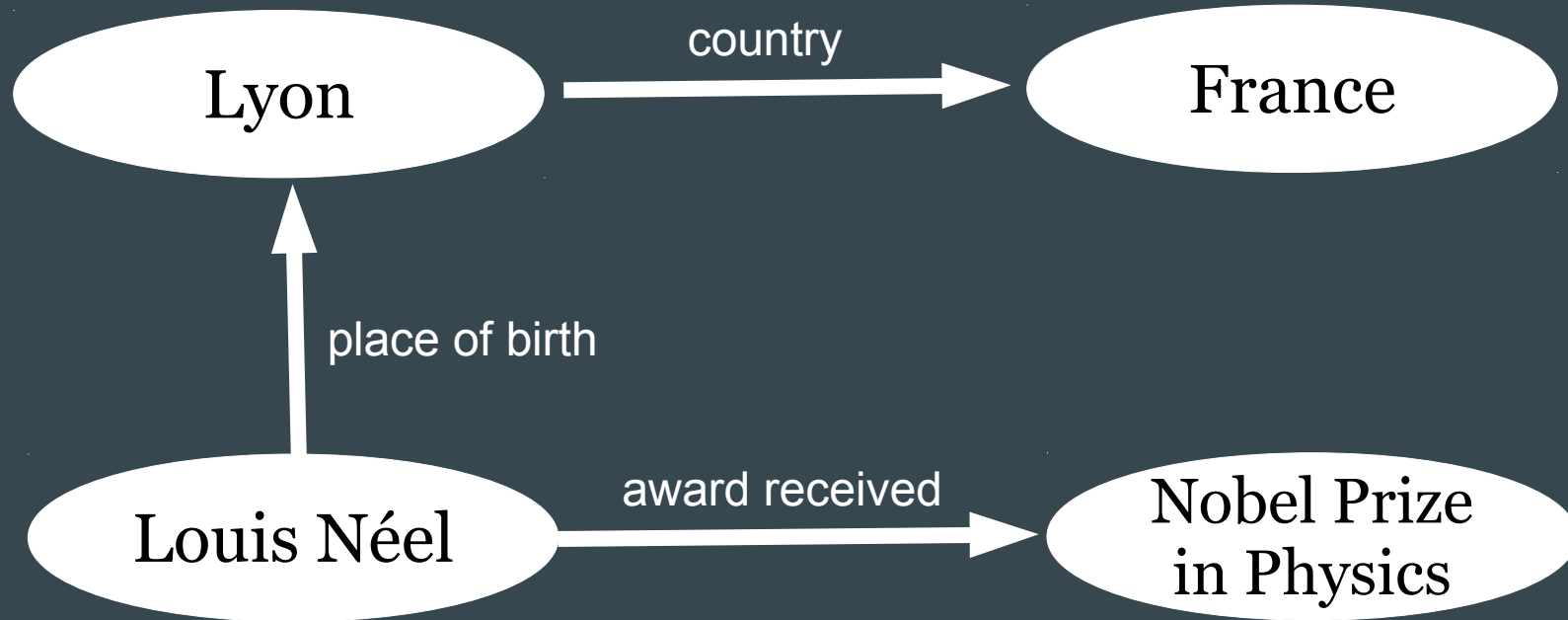
Contents [\[hide\]](#)

- 1 [Wikipedia and the Semantic Web - The Missing Links](#)
 - 1.1 [Introduction](#)
 - 1.2 [A jump start introduction to semantic technologies](#)
 - 1.3 [Design](#)
 - 1.4 [Usability aspects](#)
 - 1.5 [Implementation, performance and scalability](#)
 - 1.6 [Additional features](#)
 - 1.7 [Implementation plan](#)
 - 1.8 [Applications](#)
 - 1.9 [Related approaches](#)
 - 1.10 [Summary and conclusion](#)
 - 1.11 [Acknowledgements](#)
 - 1.12 [Bibliography](#)

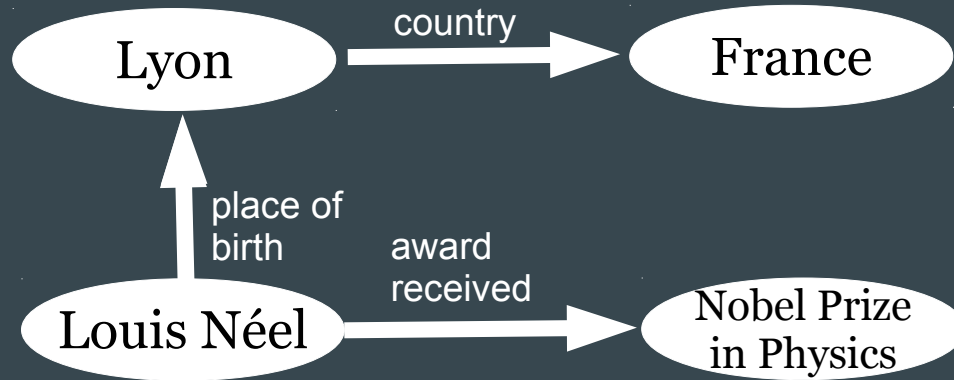
A Simple Idea (2005): “Let’s annotate Wikipedia links!”



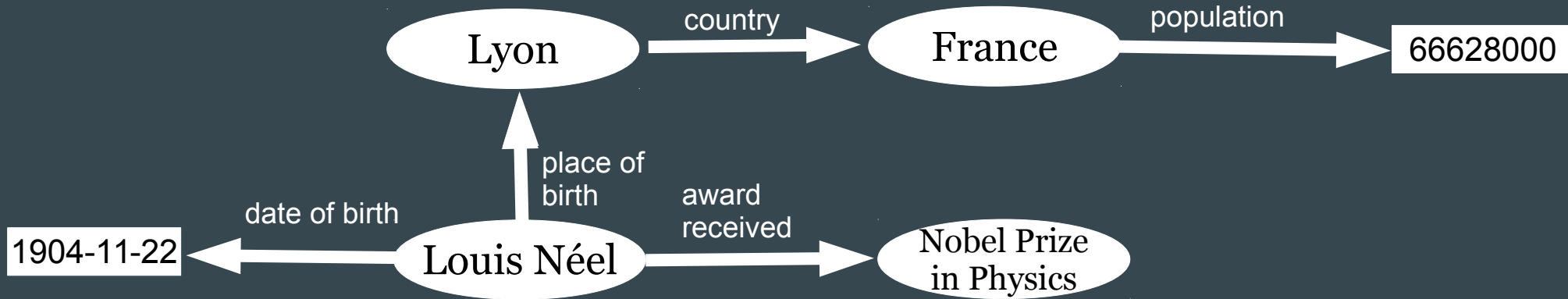
Semantic MediaWiki (2005): From Links to Graphs



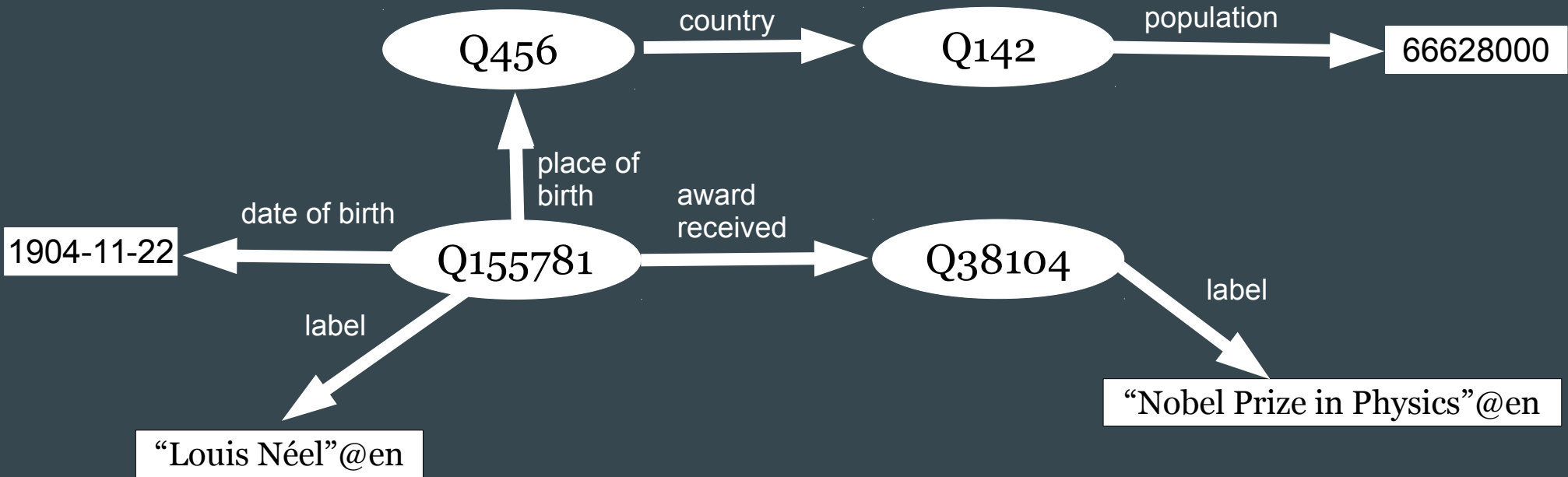
Links are not Enough: Adding Datatypes



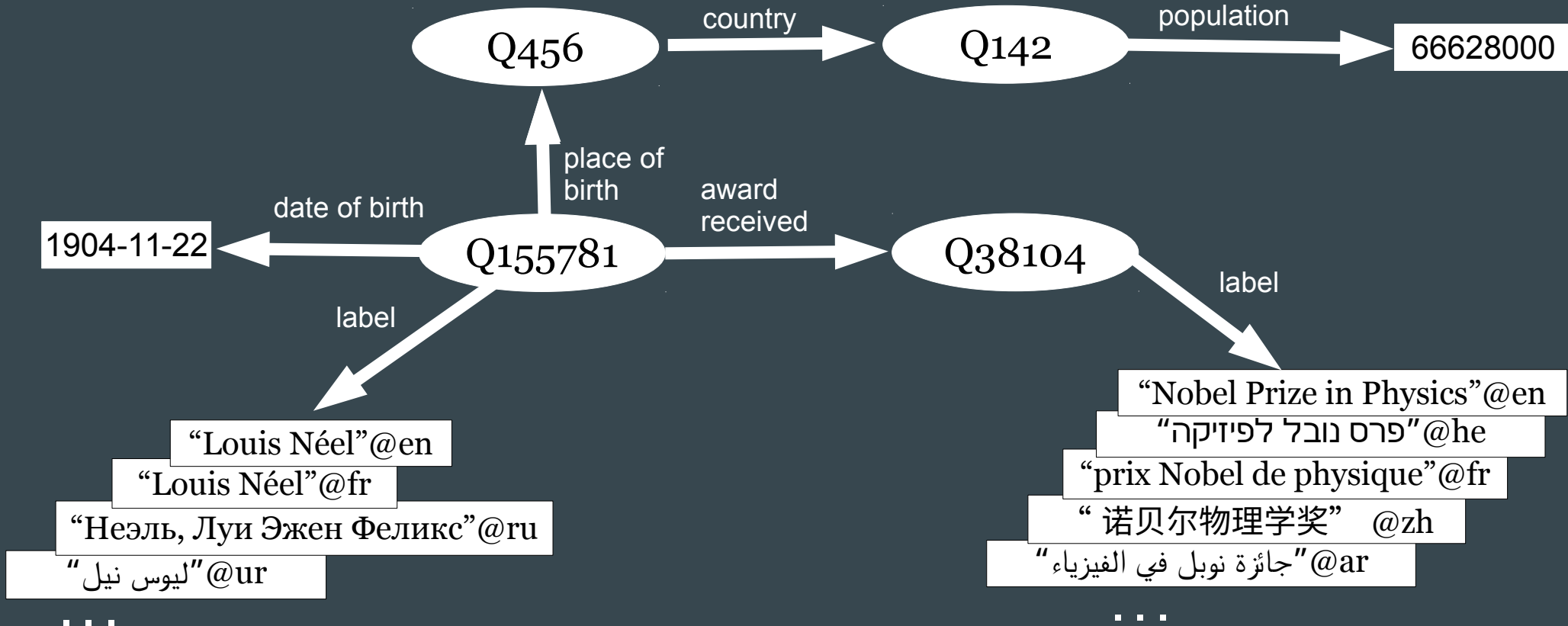
Links are not Enough: Adding Datatypes



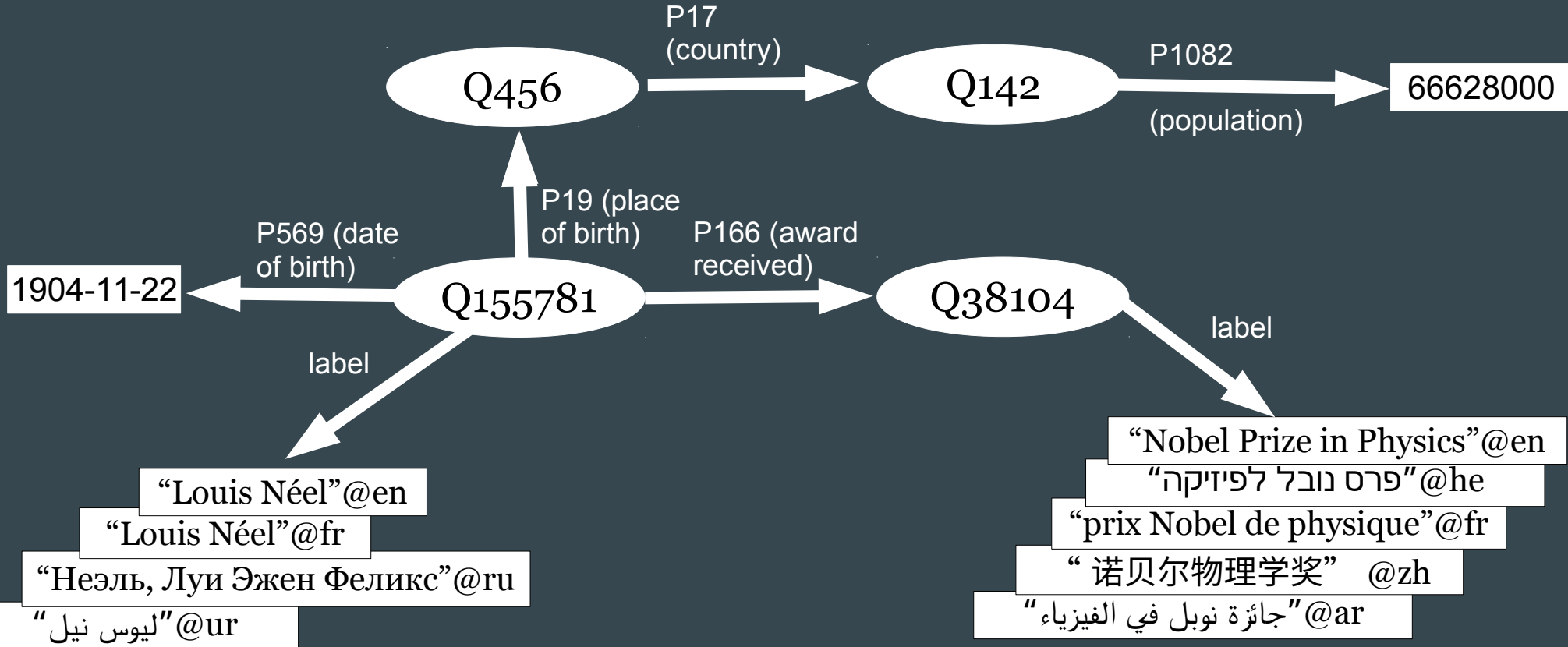
Wikidata: One Graph for Many Languages



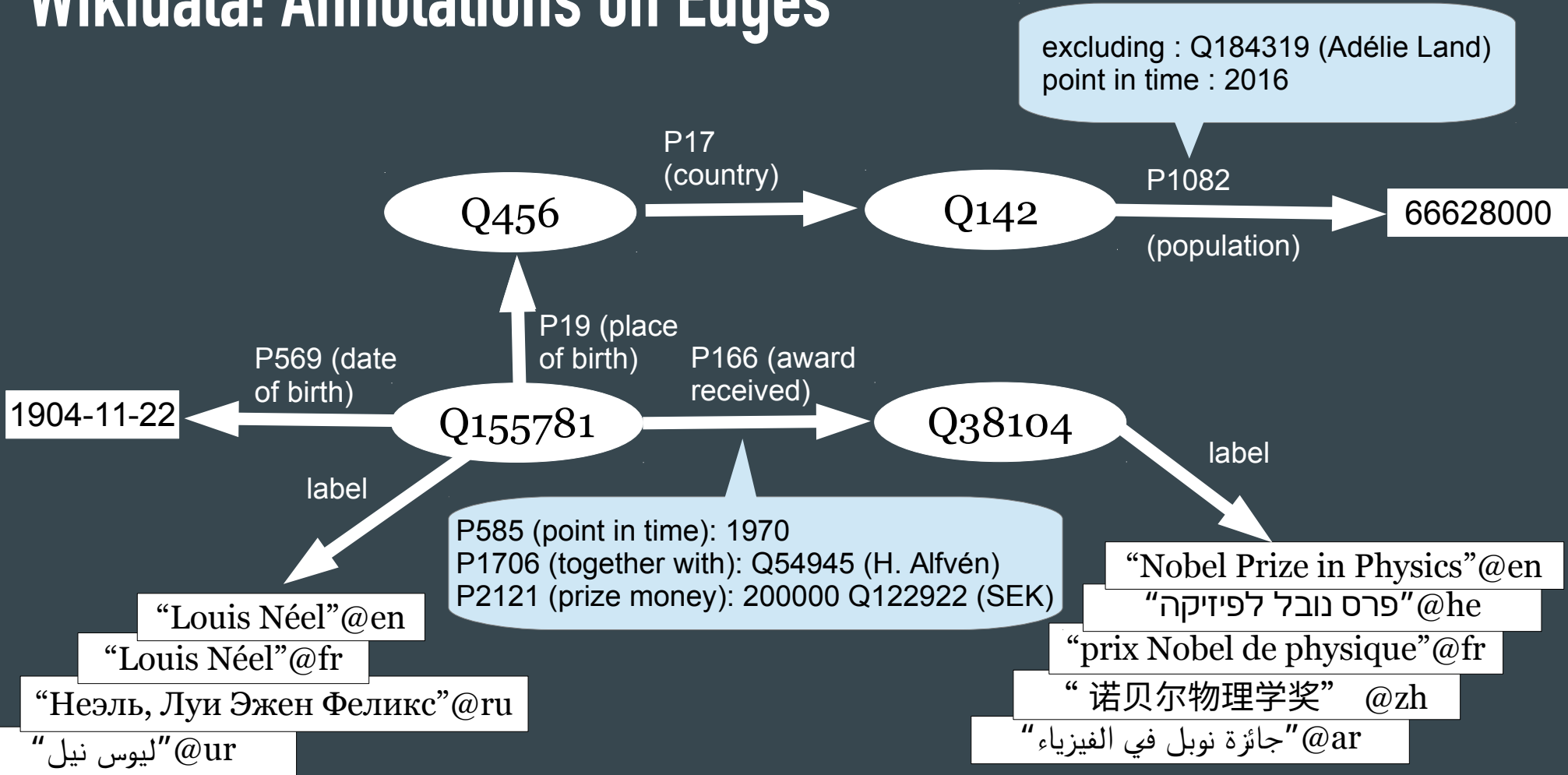
Wikidata: One Graph for Many Languages



Wikidata: One Graph for Many Languages



Wikidata: Annotations on Edges



A Not-So-Simple Idea (2012): Wikidata

Louis Néel (Q155781)

French physicist

Louis Neel | Louis Eugène Felix Néel

award received



Nobel Prize in Physics

 edit

point in time

1970

together with

[Hannes Alfvén](#)

prize money

200,000 Swedish krona

▼ 2 references

 copy

reference URL

http://www.nobelprize.org/nobel_prizes/physics/laureates

Wikidata in 2018

- ◆ >570M statements on >50M entities
- ◆ >65M links to Wiki(p|m)edia pages
- ◆ >200M labels and aliases
- ◆ >1,200M disambiguating descriptions
- ◆ >200K registered contributors, 19K monthly

More data

- ◆ Wikidata: >50M items with >570M statements

More data

- ♦ Wikidata: >50M items with >570M statements
 - ♦ OSM: >4B nodes, >230M buildings, >10M trees
 - ♦ WDC: >9.5B entities, >38B RDF triples
- ♦ Why don't we just import everything?!

More data

- ♦ Wikidata: >50M items with >570M statements
 - ♦ OSM: >4B nodes, >230M buildings, >10M trees
 - ♦ WDC: >9.5B entities, >38B RDF triples
- ♦ Why don't we just import everything?!
 - ♦ Notability? Well, sometimes ...
 - ♦ Community support! Who will maintain this?

More data: current efforts

- ◆ Data donation guidelines
- ◆ Wikidata aligns with >2500 databases and catalogues
- ◆ Supervised data alignment with crowdsourcing (Mix'n'Match)

AcademiaNet	Database for excellent female scientists	99%
Austrian Parliament ID	Austrian Parliament's "Who's Who" database	99%
International World Games Ass	Sportspeople	24% 59%
botanist author abbreviation	standard form (official abbreviation) of a personal name for use in an :	99%
Mactutor	identifer of the person's biography in the MacTutor History of Mathe	98%
South Australian Football Hall	Australian rules football players	72%
AIBL members	Membres de l'Académie des Inscriptions et Belles Lettres (AIBL)	70%
Lotsawa House Tibetan author	Tibetan authors in the Lotsawa House library	40%
parliament.uk	UK MP or Peer's biography	95%
EPHE	identifier of a researcher on the online prosopographical dictionary of	74% 16%
Sport Australia Hall of Fame	Sportspeople linked to Australia	73% 10%
North Carolina Sports Hall of F	Sportspeople linked to North Carolina	54% 16%

More data: current efforts

Soccerdonna

Soccerdonna website female association football player db

Markus Krötzsch

Load next entry on empty search results

Casey Short

'player, born 23.08.1990 at Naperville, Illinois plays '



The screenshot shows the Soccerdonna website profile for Casey Short. At the top, there is a search bar and navigation tabs for 'STARTSEITE', 'WETTBEWERBE', '1. BUNDESLIGA', and 'EUROPA'. The profile header includes the player's name 'Casey Short' and a photo of her in a Chicago Red Stars jersey. Below this, there is a 'Facebook' widget showing 'Soccer...' with 2.6K likes and a 'Like Page' button. The main profile section is titled 'DAS PROFIL VON CASEY SHORT' and contains the following information:

Geburtsdatum:	23.08.1990
Geburtsort:	Naperville, Illinois
Alter:	27
Geburtsname:	Casey Marie Short
Grösse:	1,75
Nationalität:	Vereinigte Staaten
Position:	Abwehr
Vertrag bis:	?
Debüt (Team):	17.04.2016

Below the profile is a table for 'LEISTUNGSDATEN DER AKTUELLEN SPIELZEIT':

Wettbewerb	Spiele		
SheBelieves Cup	2	-	-

The screenshot shows a search engine results page for 'Casey Short'. The search bar contains 'Casey Short' and a 'Find' button. The results list includes:

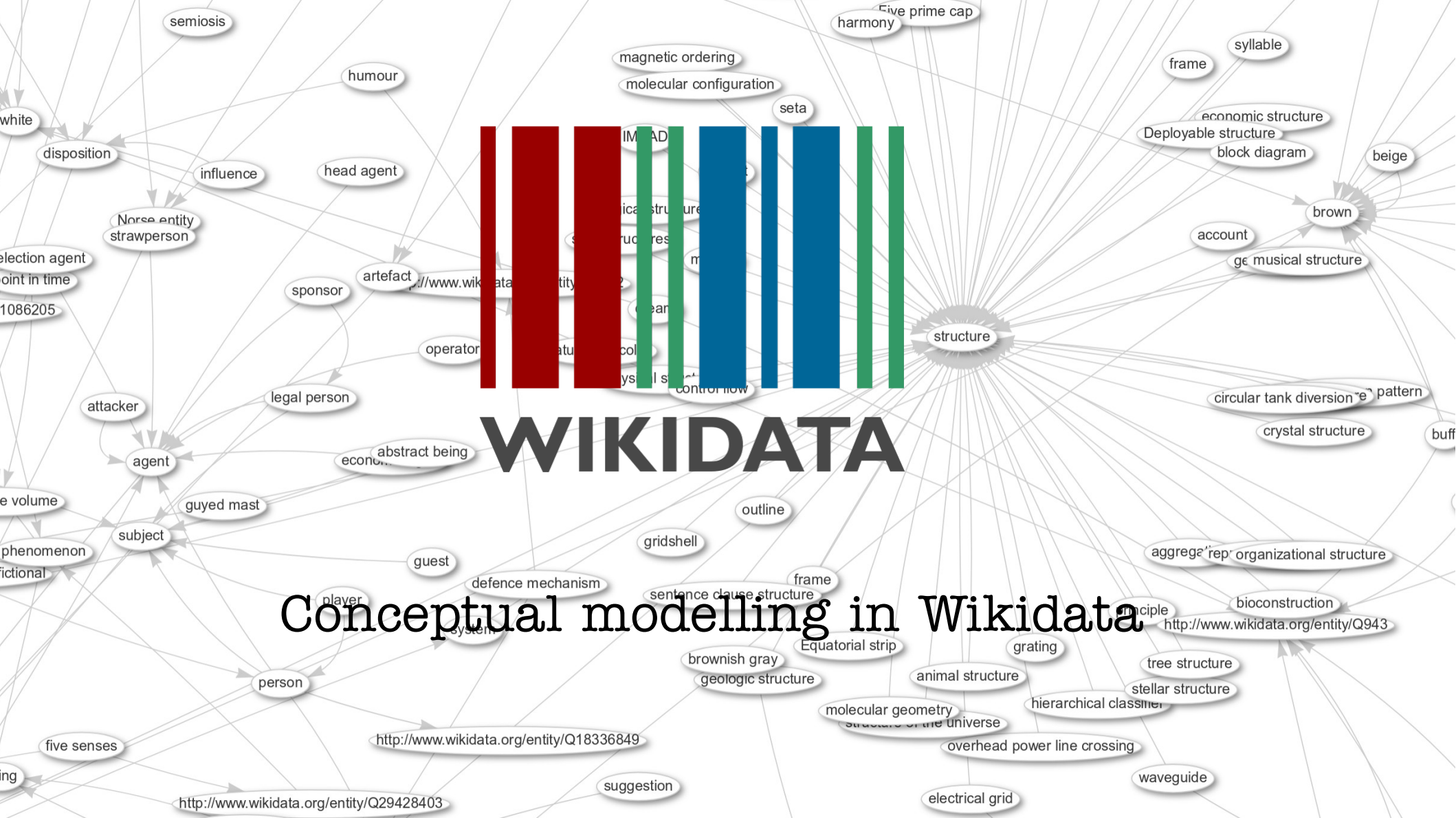
- Casey Short** [Q16766251] US-American association football player (*1990) ♀
- Alaska – Die raue Eiswelt** [Q926795] 1997 short film from United States of America
- Q17525877** [Q17525877] 1912 silent short film from United States of America
- Q17520601** [Q17520601] 2014 silent short film by James Young from United States of America
- Q24258544** [Q24258544] 1913 short film by Edward Dillon from United States of America

The screenshot shows a Wikidata page for Casey Short. At the top, there is a search bar and a 'Wikidata' label. The main content area displays the name 'Casey Short' with the identifier '(Q16766251)'. Below the name, there is a star icon and the text 'American association football player'. The 'Statements' section shows 'instance of' with the value 'human' and '0 references'. On the right side, there is a photo of Casey Short in a blue jersey.

New kinds of data

- ◆ Rolled out in 2018: **lexical data** (dictionary/thesaurus)
 - ◆ Exciting & dangerous
- ◆ Planned: **media (meta-)data** (Wikimedia Commons)
- ◆ Factual knowledge that is not in catalogues?
- ◆ Common sense?

Platform, community, and content
under continuous change



WIKIDATA

Conceptual modelling in Wikidata

<http://www.wikidata.org/entity/Q29428403>

<http://www.wikidata.org/entity/Q18336849>

<http://www.wikidata.org/entity/Q943>

Why?

- ◆ Ontological models are an important part of our world knowledge
 - relevant content for Wikidata
- ◆ Ontologies help knowledge organisation
 - also useful for search
- ◆ Schema supports data management
 - check quality or derive further facts

Wikidata is all about ontological modelling

Wikidata is all about ontological modelling

One or two items for one bridge in two locations ?

Hi all,

With @Jura1: we have a discussion on the french Project chat about should we have one or two items about a bridge that has been moved but it's going in circle and other point of view could help (@Fralambert, El Caro: also take part in the discussion.).

Wikidata is all about ontological modelling

One or two items for one bridge in two locations ?

Hi all,

With [@Jura1](#): we have a discussion on the french P chat about should we have one or two items about that has been moved but it's going in circle and other view could help ([@Fralambert](#), [El Caro](#): also take part in discussion.).

Egg yolk

Hi, I'm trying to sort the entries on the egg yolk ... [egg yolk \(Q181409\)](#), [yolk \(Q16336079\)](#) and the [egg yolk \(Q1302994\)](#).

If I understand correctly, there is one for yolk, one for egg yolk and one for chicken egg yolk ... but interwikis links are also big mess. [Mikani \(talk\)](#) 15:37, 9 August 2018 (UTC)

Wikidata is all about ontological modelling

One or two items for one bridge in two locations ?

Hi all,

With [@Jura1](#): we have a discussion on the french P

Goal as a criterion

I have added to [goal \(Q18530\)](#): subclass of (P279) --> [criterion \(Q1789452\)](#) because [goal \(Q18530\)](#) can be used with [criterion used \(P1013\)](#) (value type constraint appear). But I am not sure if it is correct... [Xaris333 \(talk\)](#) 20:11, 30 April 2018 (UTC)

Egg yolk

Hi, I'm trying to sort the entries on the egg yolk ... [egg yolk \(Q181409\)](#), [yolk \(Q16336079\)](#) and the [egg yolk \(Q1302994\)](#).

If I understand correctly, there is one for yolk, one for egg yolk for chicken egg yolk ... but interwikis links are [Mikani \(talk\)](#) 15:37, 9 August 2018 (UTC)

Wikidata is all about ontological modelling

One or two items for one bridge in two locations ?

Hi all,

With [@Jura1](#): we have a discussion on the fr

Goal as a criterion

I have added to [goal \(Q18530\)](#): subclass of [\(Q1789452\)](#) because [goal \(Q18530\)](#) can be u [\(P1013\)](#) (value type constraint appear). But correct... [Xaris333 \(talk\)](#) 20:11, 30 April 2

Egg yolk

Hi, I'm trying to sort the entries on the egg yolk ... [egg yo \(Q181409\)](#), [yolk \(Q16336079\)](#) and the [egg yolk \(Q1302994\)](#).

Death in episode number...

How to better model that a character was killed in specific episode/book/film of series? I use [manner of death \(P1196\)](#) with [qualifie described by source \(P1343\)](#). Or better as *reference*? Or some other property? And how to distinguish from the case when a death of the character *was described* in episode (as a flashback, not a main storyline)? --[Infovarius \(talk\)](#) 11:20, 19 June 2018 (UTC)

Wikidata is all about ontological modelling

One or two items for one bridge in two locations ?

Hi all,

With @Jura1: we have a discussion on the fr

Goal as a criterion

I have added to goal (Q18530): subclass of (Q1789452) be (P1013) (value correct... Xa

Egg yolk

Hi, I'm trying to sort the entries on the egg yolk ... egg yo (Q181409), yolk (Q16336079) and the egg yolk (Q1302994).

Death in episode number...

How to better model that a character was killed in specific episode/book/film of series? I use manner of death (P1196) with qualifie described by co

Edit war at Jesus Christ (Q302) concerning father (P22)

An edit war has been going on at Jesus Christ (Q302) concerning a use of the property father (P22). Would be nice if we could have it resolved.

--Njardarlogar (talk) 15:28, 2 July 2018 (UTC)

ce? Or some other when a death of the ck, not a main (UTC)

Classes in Wikidata

- ♦ Wikidata has no built-in concept of “class”
but some items represent classes
- ♦ Regular properties for ontological modelling
 - ♦ P31 “instance of”: most common property
 - ♦ P279 “subclass of”: >2M uses on >1.3M entities

**source website for the
property**

http://www.w3.org/TR/rdf-schema/#ch_subclassof ↗

http://www.w3.org/TR/2012/REC-owl2-primer-20121211/#Classes_and_Instances ↗

<https://en.wikipedia.org/wiki/CycL> ↗



SQID

[Start](#)[Properties](#)[Classes](#)[Rules](#)[About](#)[Login](#)

Label (ID) ↕	Instances ▾	Subclasses ↕
taxon (Q16521)	2425286	9
Wikimedia disambiguation page (Q4167410)	1271452	3
Wikimedia template (Q11266439)	882784	9
gene (Q7187)	710431	434045
village-level division in China (Q13100073)	588471	2
mountain (Q8502)	486426	25
protein (Q8054)	471738	448942
human settlement (Q486972)	434851	158
river (Q4022)	388669	31
street (Q79007)	355925	37
village (Q532)	302856	88
painting (Q3305213)	296709	51
hill (Q54050)	294588	38
encyclopedic article (Q17329259)	290829	0
Wikimedia list article (Q13406463)	280176	12
family name (Q101352)	240320	38

Has Property:

Has superclass:

Number of direct instances:



0

4000000

Number of direct subclasses:



0

1000000

Link with filter states:



Label (ID) ↕	Instances ↕	Subclasses ▼
protein-coding gene (Q20747295)	2	508562
protein (Q8054)	471738	448942
gene (Q7187)	710431	434045
non-coding RNA (Q427087)	83592	50380
pseudogene (Q277338)	44952	40746
badminton tournament (Q13357858)	0	25434
alcalde (Q5663900)	0	7977
aircraft (Q11436)	1511	4429
Italian wine (Q1125341)	16	2420
tender locomotive (Q20650761)	139	1882
food (Q2095)	135	1471
table apple (Q3395974)	0	1318
transfer RNA (Q201448)	2773	1171
tank locomotive (Q785745)	129	1149
military aircraft (Q216916)	32	1027
car (Q1420)	1463	940

Has Property:

Has superclass:

Number of direct instances:



0

4000000

Number of direct subclasses:



0

1000000

Link with filter states:

“Ontology as data”

- ◆ Only real schema information: property types
- ◆ All other modelling as part of data:
 - ◆ Classes can be instances (meta-modelling)
 - ◆ No clear separation of meta-levels
 - ◆ P2445 “is meta-subclass of” (hardly used)
 - ◆ Ontological properties can have qualifiers

Semantics anyone?

- ◆ No official ontological semantics
- ◆ Intended meaning laid out in documentation
 - ◆ P31 and P279 understood as \in and \subseteq
- ◆ Semantics of corner cases unclear
 - ◆ Qualified subclass-of statements?
 - ◆ Meta-modelling semantics?
- ◆ Practical interpretation depends on context

Ok, so how does that work out?

- ◆ Topical sub-communities create own guidelines
- ◆ Agreeable results for specific topics

astronomical body (Q6999)
celestial body

Classification ▼

Direct superclasses

Direct subclasses

With instances **37** With subclasses **30** All **58**

satellite **241** , substellar object **199** , star **180** , Q6188101 **76** , galaxy **52** ,
gravitationally bound system **41** , massive compact halo object **34** , star system **32** ,
extrasolar object **25** , interstellar cloud **21** , co-orbital object **14** ,
hypothetical astronomical object **13** , astroengineering object **11** , black hole **11** , star cluster **9** ,

Ok, so how does that work out?

- ◆ Lack of global coordination, QA, and guidance

Wikidata:WikiProject Ontology

WikiProject Ontology

The **WikiProject Ontology** is mainly about reaching deep into the nature of being, becoming, existence, and reality, and applying those insights during Wikidata's maintenance tasks. The more practical aims of the project are:

- to support a broad semantic interoperability between notable ontologies like DOLCE, BFO, SUMO, Lemon, RDA, etc.
- to build consensus around the main branches of our [core concept tree](#) and how they relate to each other
- to gain a deep understanding about the meaning of our [upper ontology](#) and to transfer this knowledge to others in practical terms



For specific subject areas, the class hierarchy and properties may be covered in detail on a WikiProject page devoted to that subject - for example [Wikidata:WikiProject Books](#), [Wikidata:WikiProject Names](#) or [Wikidata:WikiProject Chemistry](#).

Subpages [\[edit \]](#)

- [WikiProject Ontology/Biocuration 2016](#)
- [WikiProject Ontology/Problems/Anti-pattern 2](#)
- [WikiProject Ontology/Problems/instance of 3rd-order subclass of self](#)
- [WikiProject Ontology/Problems/High order metaclasses](#)

Problem 1: Semantic drift

- ♦ A classical issue in wiki-based modelling
- ♦ Some superclasses of “clarinet” (Q8343):
 - ♦ Woodwind instrument, single-reed instrument, reed aerophone, reed or free reed aerophone, aerophones, musical instrument
 - ♦ Tool, product, artificial physical object, artefact, concrete object, object (Q488383), object (Q17553950), artificial entity, entity
 - ♦ Goods, goods and services
 - ♦ Result
 - ♦ Logical consequence

Problem 2: Structural bugs

- ◆ Cycles (in subclass of, rarely even instance-of)
 - ◆ “Binder” subclass of “thickener”
 - ◆ “Thickener” instance of “binder”
- ◆ Mix-up of meta-levels
 - ◆ “Noodle” subclass of “pasta”
 - ◆ “Noodle” instance of “type of pasta”
 - ◆ “Type of pasta” subclass of “pasta”

Problem 3: The Upper Level

- ♦ Intended top-class is entity (Q35120)
- ♦ Entity has 60 direct subclasses, including:
 - ♦ Temporal entity, geographic entity, anatomical entity, political entity, chemical entity, ...
 - ♦ Type, (meta)class, part
 - ♦ Independent continuant, quality, substance (Q27166344), substance (Q378078), cause, space, agent, object
 - ♦ Former entity, Norse entity, untitled entity, assumed entity
 - ♦ Green, electron donor, stakeholder, contact point, problem

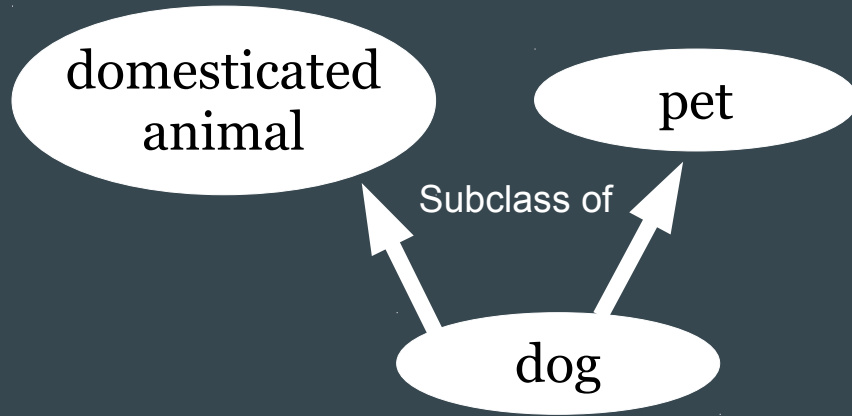
Problem 4: Conceptual ambiguity

- ◆ Entities may be conceptually overloaded
 - ◆ Partly inherited from Wikipedia
 - ◆ Partly created to integrate viewpoints
- ◆ Examples:
 - ◆ “Embassy” is a subclass of “building” and “organization”
- ◆ Meanwhile, this is handled by the community quite well – many earlier cases are fixed

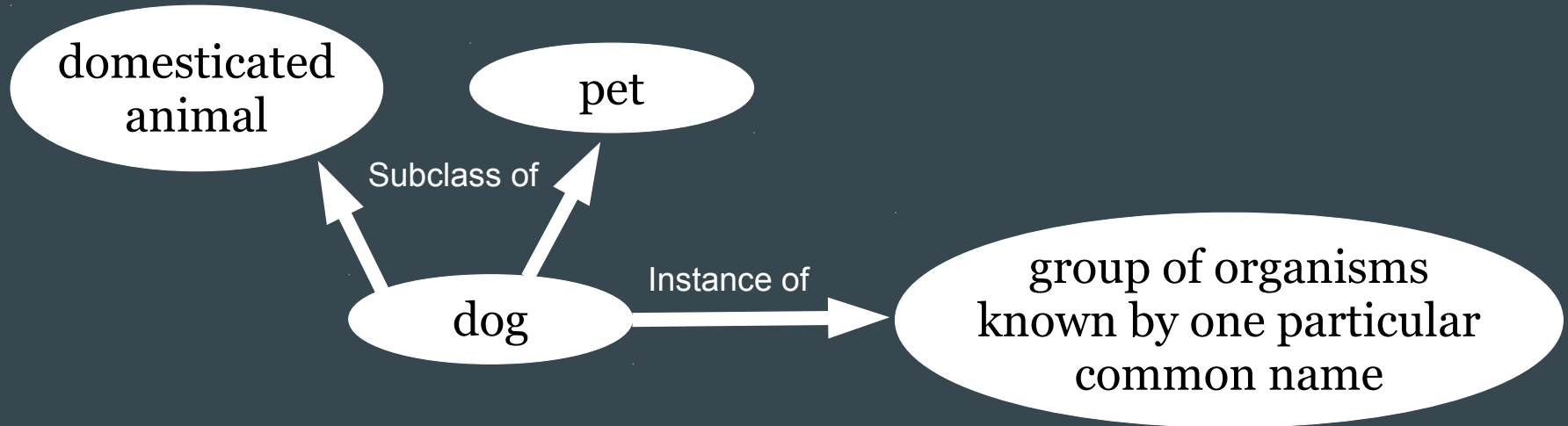
Problem 5: Unintegrated local models

- ♦ Very different design decisions taken for different domains:
“Which aspects to model with classes?”
- ♦ Symptoms:
 - ♦ Incoherent granularity (“mammal” has almost no subclasses, “building” has an elaborate hierarchy beneath, “human” has many subclasses, but they are not to be used with instance of)
 - ♦ Parallel hierarchies (parent taxons, human professions, ...)
 - ♦ Subclass of often fails for navigation

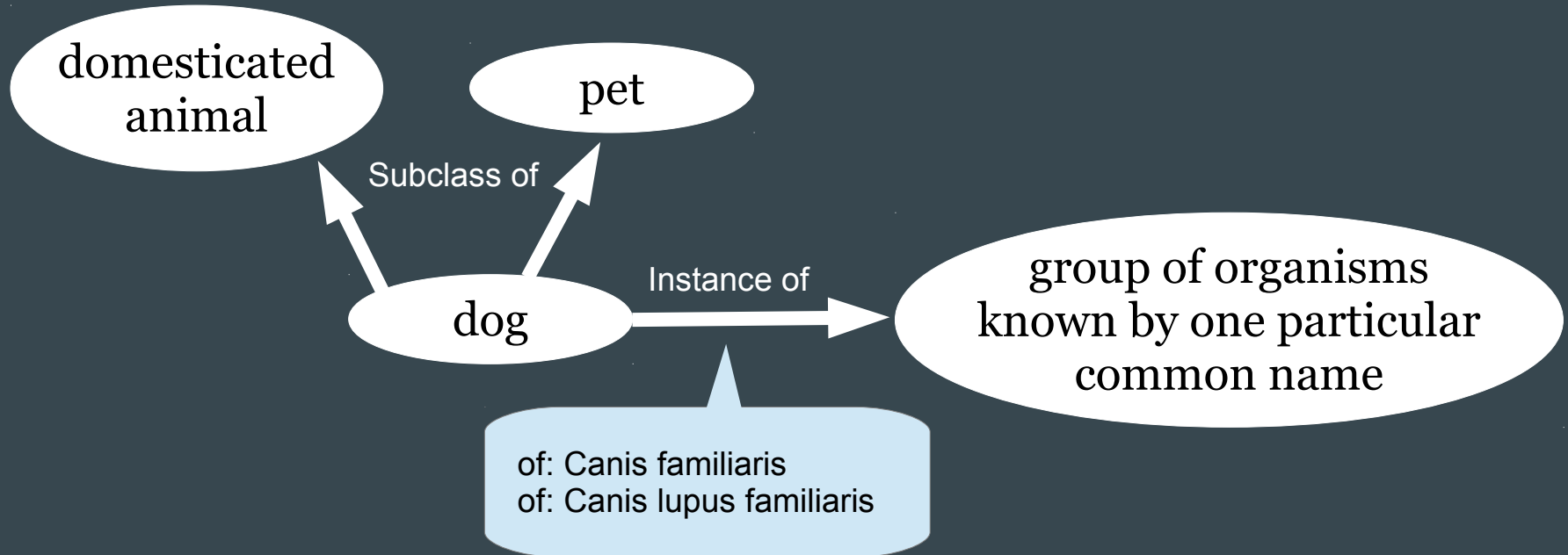
Example: from dog to mammal



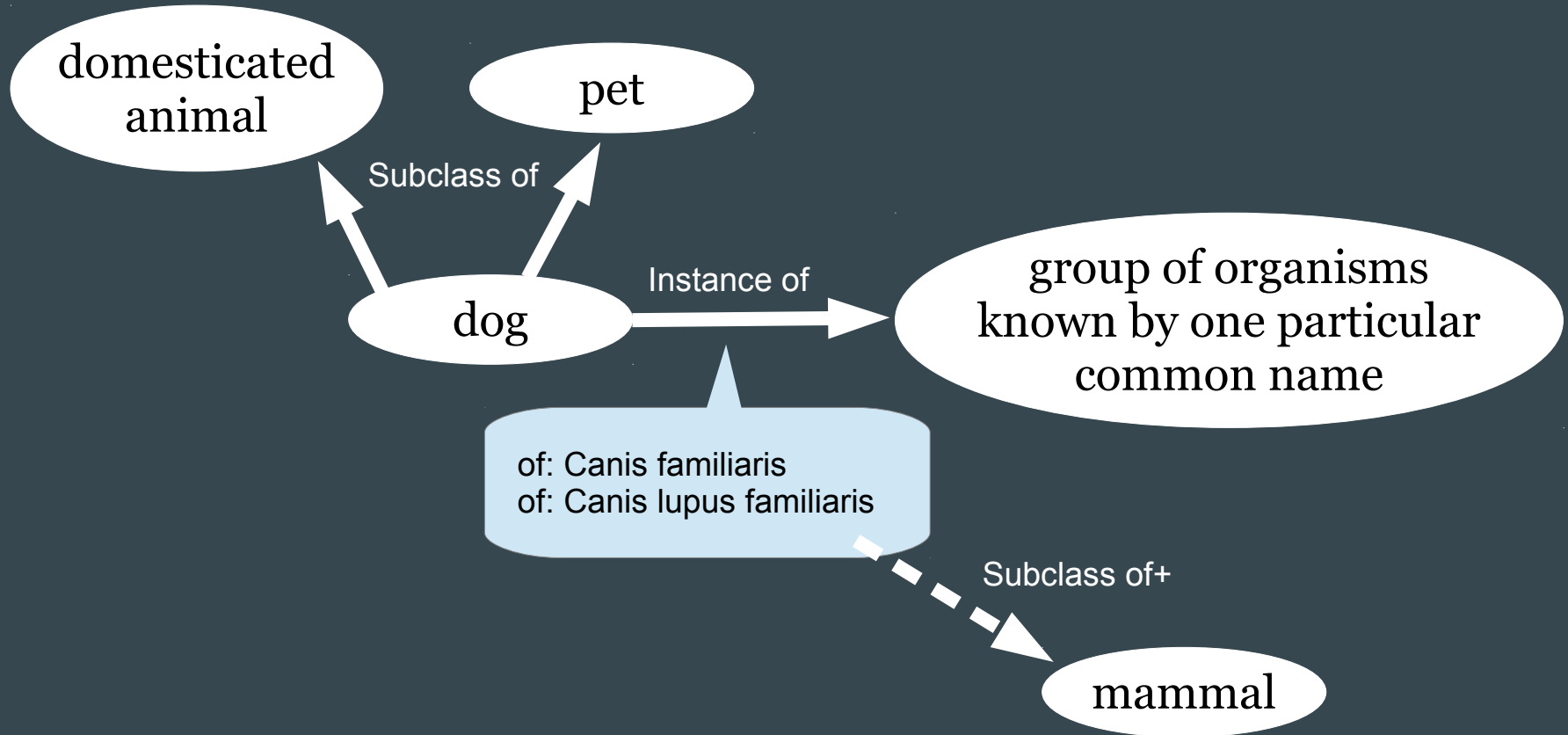
Example: from dog to mammal



Example: from dog to mammal



Example: from dog to mammal



Why is everything so hard?

- ◆ Local editing vs. global semantics
- ◆ Most editors lack global view
- ◆ No overall use case, but many local use cases
- ◆ Internationalisation: concepts not translatable
(“Obst”@de and “Frucht”@de vs. “fruit”@en and “fruit”@en;
“Millionenstadt”@de vs. “city with millions of inhabitants”@en)
- ◆ Ontology modelling is hard, even experts fight



WIKIDATA

Constraints

Modelling beyond classes

- ◆ Constraints are encoded as statements on property pages
- ◆ Define common requirements on property usage
 - ◆ Functionality, symmetry, transitivity, ...
 - ◆ Disjointness, value restrictions and format
 - ◆ Schema information (e.g., allowed qualifiers)
- ◆ Used for quality control and documentation

Example: constraints on subclass of

property constraint

6 statements ▾

conflicts-with constraint (type of constraint for Wikidata properties: used to specify that an item must not have a given statement) >

property : instance of

item of property constraint : **common name** (name generally used for a taxon, group of taxa or organism(s))

item of property constraint : **Wikimedia template** (type of page in the Wikimedia system. Use with **P31** 'instance of' for template pages)

item of property constraint : **Wikimedia list article** (page of a Wikimedia project with a list of something)

item of property constraint : **Wikimedia category** (use with 'instance of' (**P31**) for Wikimedia category)

item of property constraint : **Wikidata property** (part of statements according to the Wikidata data model)

property scope constraint (constraint to define the scope of the property (main value, qualifier, references, or combination); only supported by KrBot currently) >

property scope : **as main value** (property scope type)

conflicts-with constraint (type of constraint for Wikidata properties: used to specify that an item must not have a given statement) >

property : subproperty of

constraint status : **mandatory constraint** (status of a Wikidata property constraint: indicates that the specified constraint applies to the subject property without exception and must not be violated)

value requires statement constraint (type of constraint for Wikidata properties: used to specify that the referenced item should have a statement with a given property) >

property : subclass of

exception to constraint : **entity** (something that exists in the identified universe)

allowed entity types constraint (type of constraint for Wikidata properties: used to specify that only listed entity types are valid for this property) >

item of property constraint : **Wikibase item** (Wikibase property value datatype. See **Q16222597** for Wikidata item)

constraint status : **mandatory constraint** (status of a Wikidata property constraint: indicates that the specified constraint applies to the subject property without exception and must not be violated)

contemporary constraint (type of constraint for Wikidata properties: used to specify that the subject and the object have to coincide or coexist at some point of history) >

Constraints in current usage

- ◆ P2302 (property constraint) used in >21K statements
- ◆ Most common constraints:
 - ◆ “Item requires statement” (generalises property domain)
 - ◆ “Format” (regular expression)
 - ◆ “Single value” (functionality) & “Distinct value” (inv. func.)
 - ◆ “Type” and “Value type” (transitive P279 classification)
 - ◆ “Scope” (statement/qualifier/reference/... property?)

Germany (Q183)

federal parliamentary republic in central-western Europe

FRG | BRD | Bundesrepublik Deutschland | Federal Republic of Germany | de | 

[basic form of government](#)



[federal parliamentary republic](#)



 [edit](#)

Potential issues



[conflicts-with constraint](#)

[Help](#) [Discuss](#)

An entity should not have a statement for [basic form of government](#) if it also has a statement for [instance of](#) with value [republic](#).

[one-of constraint](#)

[Help](#) [Discuss](#)

The value for [basic form of government](#) should be one of the following:

- [republic](#)
- [constitutional monarchy](#)
- [federal republic](#)
- [representative democracy](#)
- [parliamentary system](#)
- [soviet republic](#)

 [copy](#)

 [copy](#)

Semantics anyone?

- ◆ No official ontological semantics
 - ◆ Documentation not always clear
 - ◆ Conditions partly implemented (e.g., in SPARQL)
- ◆ Used during editing to create warnings (prescriptive semantics)
- ◆ Also used to suggest additions of missing information (descriptive use)



WIKIDATA

Ways forward

Lots of data, little ontology?

No!

“Ontology as data”

→

“Ontology is data”

Airbus A380 (Q5830)

double-deck aircraft made by Airbus

 edit

A380 | Airbus Jumbo Jet | A380 Jumbo Jet

powerplant	  Rolls-Royce Trent 700  edit
	quantity 4 ▼ 0 references + add reference
	  Engine Alliance GP7000  edit
	quantity 4 ▼ 0 references + add reference
+ add value	

This describes terminological knowledge: “Every aircraft of type has engines of the given type.”

But where is the semantics?

- ◆ All data needs to be interpreted
 - ◆ Class hierarchy and constraints are just two examples
- ◆ New facilities are needed to assign meaning to data structures
 - ◆ Think “customisable rules of inference”
 - ◆ Non-unique, user-definable, context-dependent
 - ◆ But usually crisp and precise nonetheless



Interpreting data with rules of inference

[edit label](#)

Nauru (Q697)

Republic of Nauru | Pleasant Island | Naoero | nr | 

republic in Oceania

head of state

2+28 statements ▼

[Baron Waqa](#) (Nauruan politician) ★ [▶](#)
start time : 2013-06-11

[Sprent Dabwido](#) (president of Nauru) [▶](#)

[Frederick Pitcher](#) (President of Nauru) [▶](#)
start time : 2011-11-10
end time : 2011-11-15

(Proposal) ✓
Source: MARS

[Marcus Stephen](#) (Nauruan sportperson and politician) [▶](#)
start time : 2007-12-19
end time : 2011-11-10

(Proposal) ✓
Source: MARS

[Ludwig Scotty](#) (Nauruan politician, president) [▶](#)
start time : 2004-06-22
end time : 2007-12-19

(Proposal) ✓
Source: MARS

**[Marx & MK, International
Semantic Web Conf. 2017]**

<https://tools.wmflabs.org/sqid/>

[D. Ó. H. ...](#) (1947-2023) [▶](#)

(Proposal) ✓

Frederick Pitcher (Q917601)

[edit label](#)

position held

[President of Nauru](#) (head of state and government in Nauru) >

start time : 2011-11-10

end time : 2011-11-15

replaces : [Marcus Stephen](#) (Nauruan sportperson and politician)

replaced by : [Sprent Dabwido](#) (president of Nauru)

Nauru (Q697)

[edit label](#)

Republic of Nauru | Pleasant Island | Naoero | nr | 

office held by head of government

[President of Nauru](#) (head of state and government in Nauru) >

A rule of inference:

```
(?headOfState.position heldP39 = ?headOffice) @?X,
```

```
(?country.office held by head of stateP1906 = ?headOffice) @?Y
```

```
→ (?country.head of stateP35 = ?headOfState) @ {start timeP580 = ?X.start timeP580,  
end timeP582 = ?X.end timeP582}
```

[Marx et al., International Joint Conf. On Artif. Intellig. 2017]

Wikidata's questions to you

- ◆ The problem is large. How to draw boundaries?
Where to start?
- ◆ Simple (anti-)patterns to focus on?
- ◆ Developing different models alongside one another without crashing? Multi-application modelling?
- ◆ Which modelling concepts are already used implicitly? Can we isolate conflicting approaches?

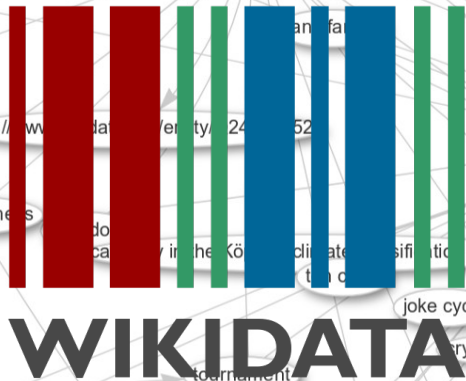
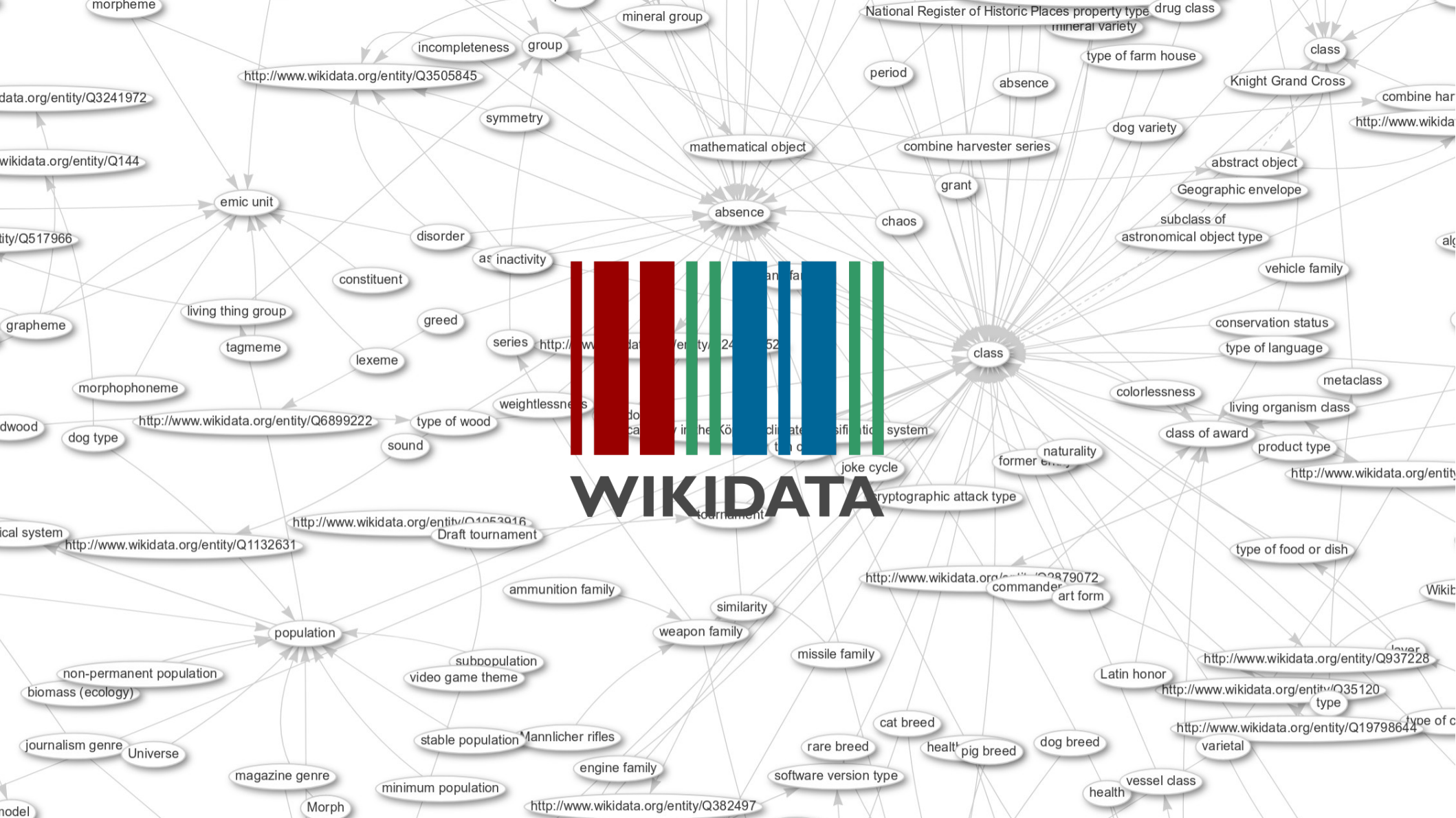
What can Wikidata offer in turn?

- ◆ New knowledge structures, new patterns!
- ◆ Sincere users open to new tools and methods
- ◆ Large datasets for analysis (knowledge graph, user activity, queries)
- ◆ Immediate practical relevance

Conclusion and Outlook

- ♦ Wikidata is a fascinating, fast-moving project with an open, ontology-friendly community
- ♦ Good ontologies are hard work and don't just “emerge”
- ♦ Much work is being done, much more is needed still

How can we move from
20th century closed-group, top-down ontology engineering to
collaborative modelling of context-aware, robust schemas
for future knowledge graphs?



WIKIDATA

Literature

- Stanislav Malyshev, Markus Krötzsch, Larry González, Julius Gonsior, Adrian Bielefeldt: “Getting the Most out of Wikidata: Semantic Technology Usage in Wikipedia’s Knowledge Graph” In Denny Vrandečić, et al., eds., Proceedings of the 17th International Semantic Web Conference (ISWC'18)
- Fredo Erxleben, Michael Günther, Markus Krötzsch, Julian Mendez, Denny Vrandečić: “Introducing Wikidata to the Linked Data Web” In Proceedings of the 13th International Semantic Web Conference (ISWC 2014)
- Maximilian Marx, Markus Krötzsch: “SQID: Towards Ontological Reasoning for Wikidata” In Proceedings of the ISWC 2017 Posters & Demonstrations Track, CEUR Workshop Proceedings. CEUR-WS.org
- Maximilian Marx, Markus Krötzsch, Veronika Thost: “Logic on MARS: Ontologies for generalised property graphs” Proceedings of the 26th International Joint Conference on Artificial Intelligence (IJCAI'17), 1188-1194, 2017