

TAXREF-LD: A Reference Thesaurus for Biodiversity on the Web of Linked Data



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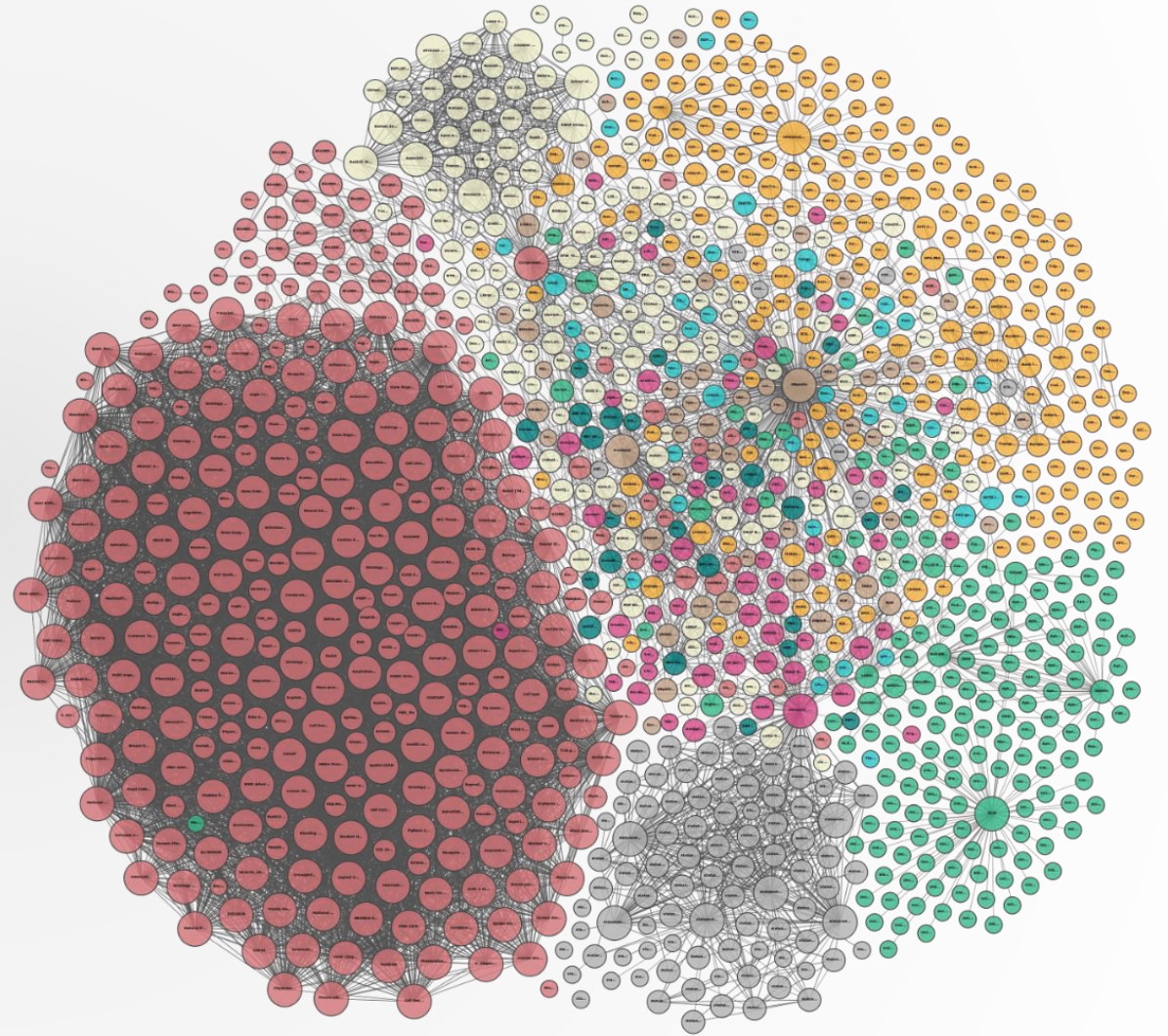


Taxonomic registers are biodiversity key tools

Backbone of thematic DBs and apps

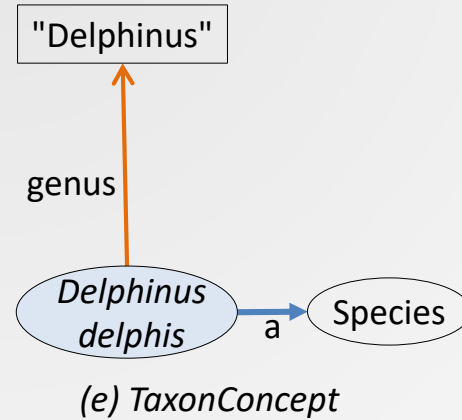
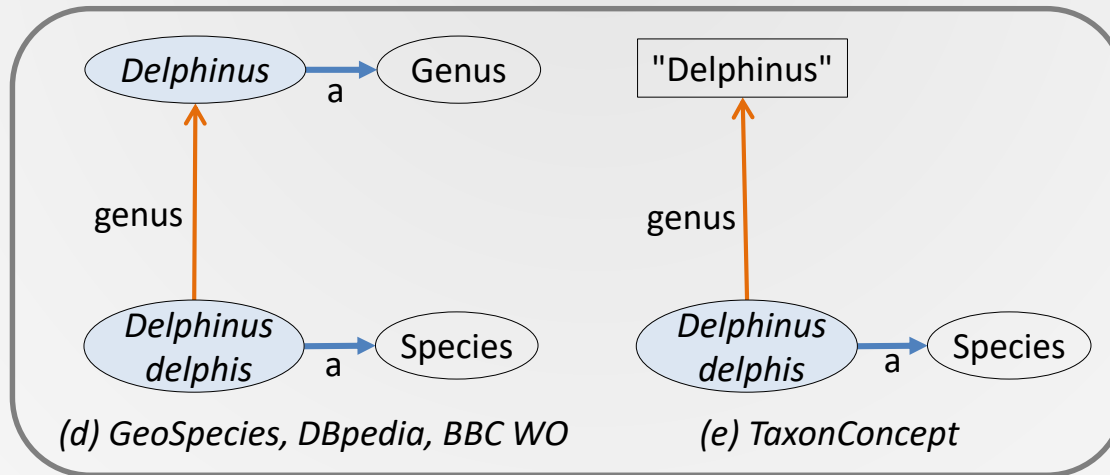
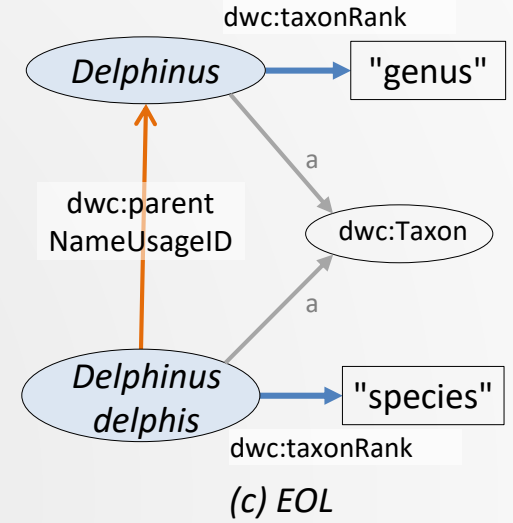
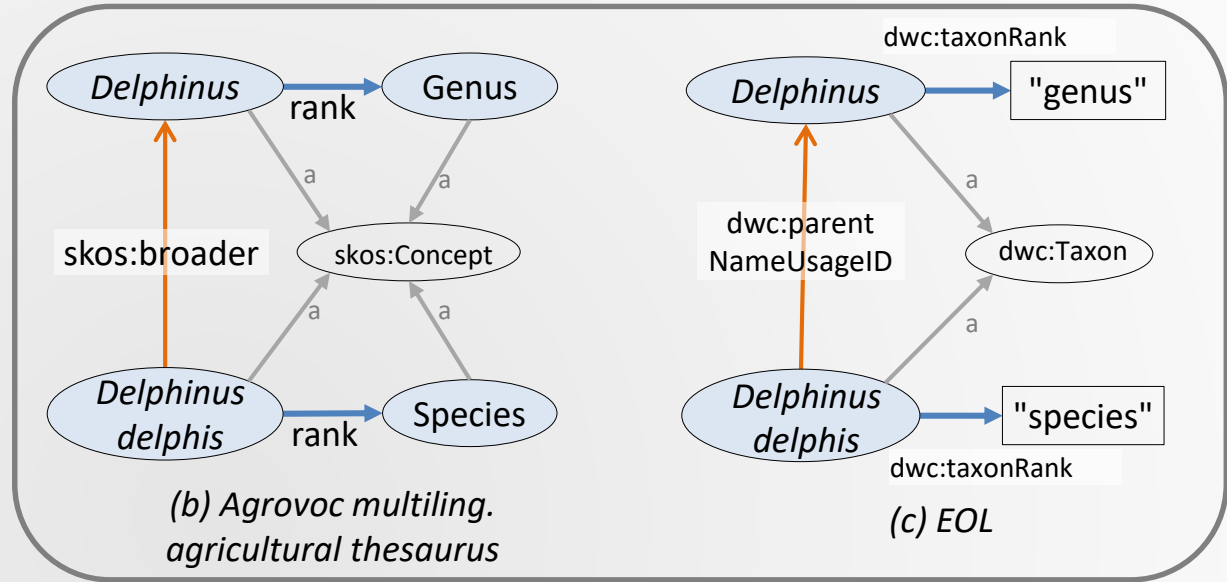
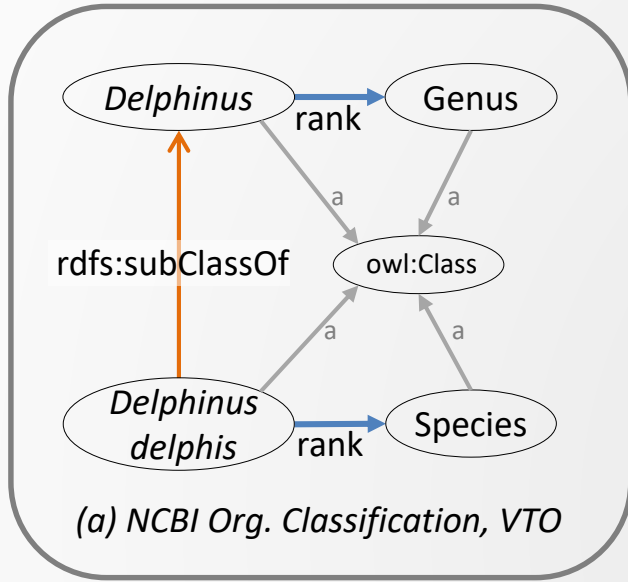
Enable data integration across
biological domains, regions, epochs

“Natural” candidates for publication
in the Web of Data as Linked Data

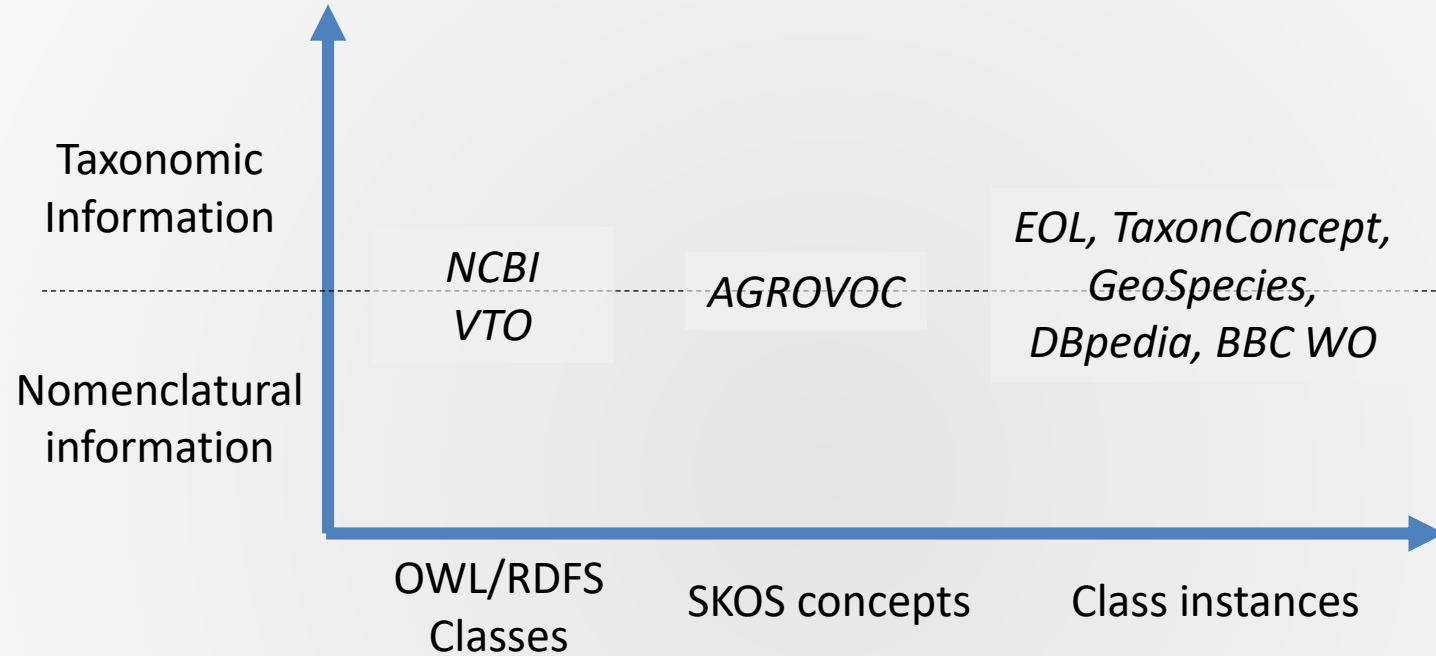


Linking Open Data cloud diagram 2017, by Andrejs Abele, John P. McCrae, Paul Buitelaar, Anja Jentzsch and Richard Cyganiak. <http://lod-cloud.net/>

Different models to represent taxonomic registers as LOD



Different models to account for the same reality



All equally valid from the biological perspective,
yet slightly different from the SW perspective.

Challenge 1: accommodate taxonomic changes

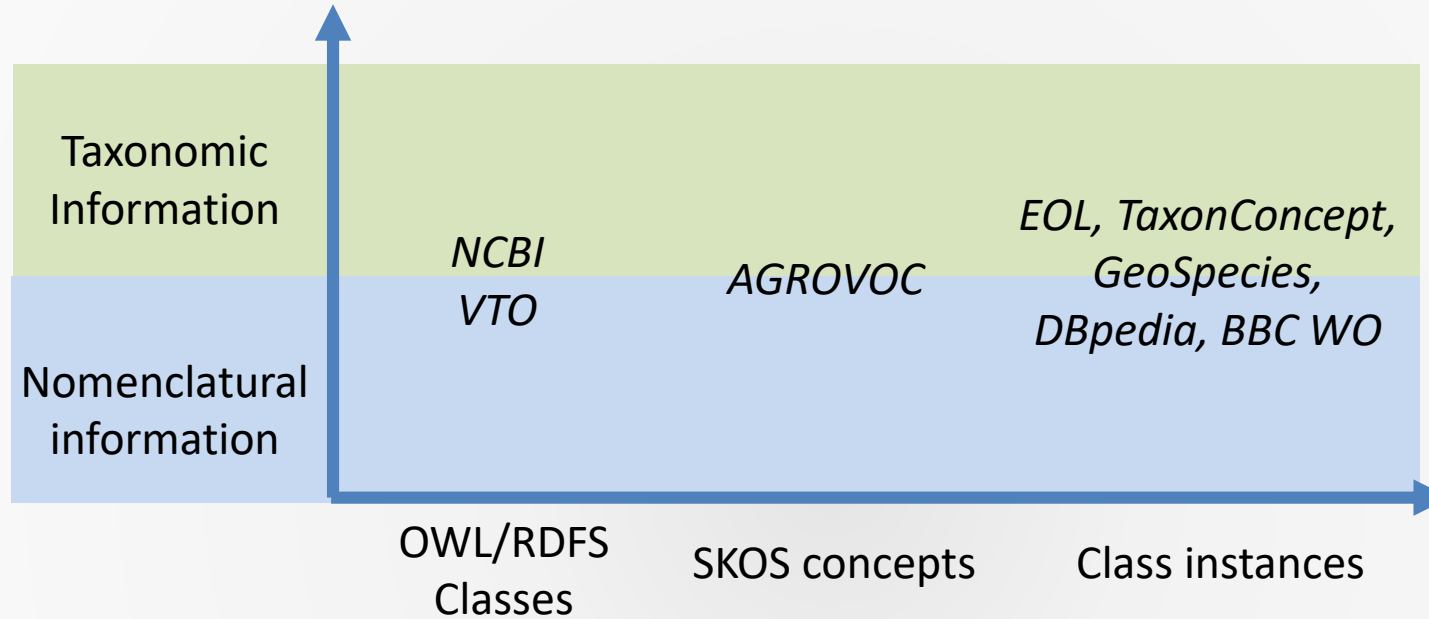
Delphinus delphis Linnaeus, 1758

Delphinus capensis Gray, 1828

Considered as distinct species until 2015.

Since then, *Delphinus delphis* Linnaeus, 1758 is retained as the taxon's reference name, while *Delphinus capensis* Gray, 1828 is a synonym.

Challenge 1: accommodate taxonomic changes

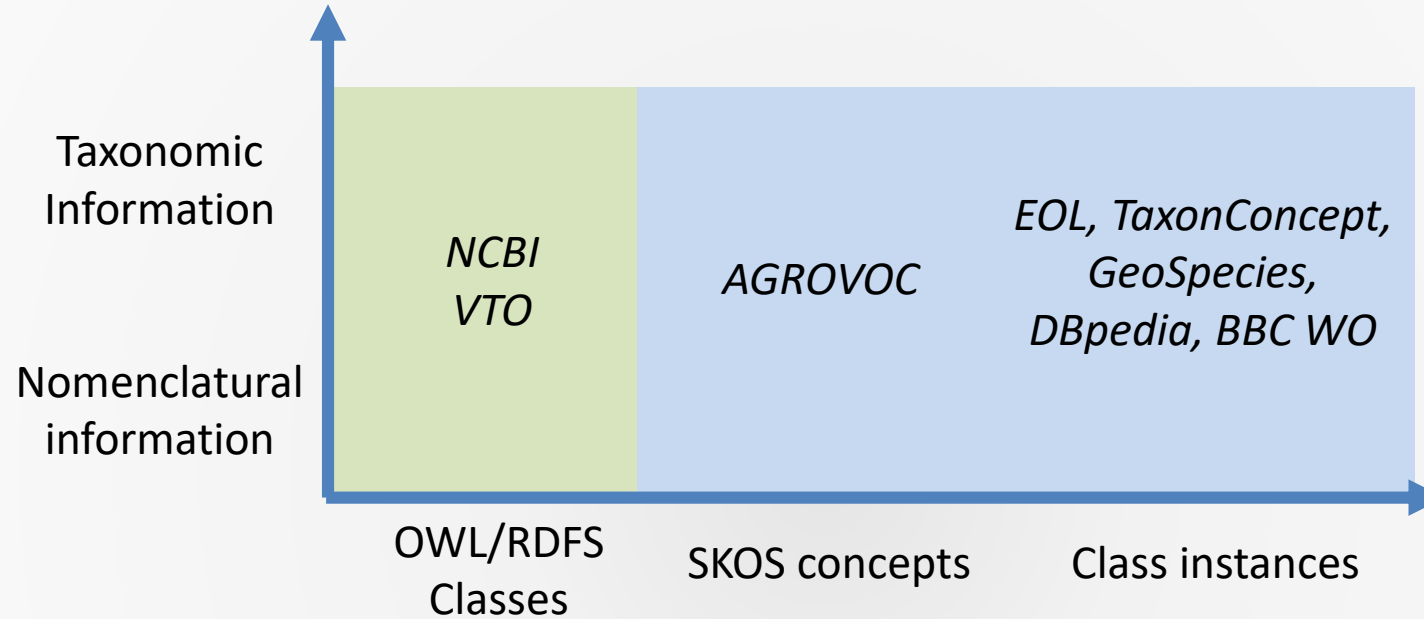


How to accommodate changes if nomenclatural & taxonomic information are intertwined?

Tracking/describing changes require that names & taxa be distinct resources [1].

[1] R. Chawuthai, H. Takeda, V. Wuwongse, U. Jinbo. *Presenting and Preserving the Change in Taxonomic Knowledge for Linked Data*. *Semantic Web*. 7 (2016) 589–616.

Challenge 2: interlinking data sets not always possible



How to align classes and class instances?

- *owl:sameAs*, *skos:exactMatch*, *owl:equivalentClass*: discouraged by DL best practices [2]
- *rdfs:seeAlso*: weak semantics

[2] F. Baader, D. Calvanese, D.L. McGuinness, D. Nardi, P.F. Patel-Schneider. *The Description Logic Handbook: Theory, Implementation, and Applications*. Cambridge University Press, New York, NY, USA (2003).



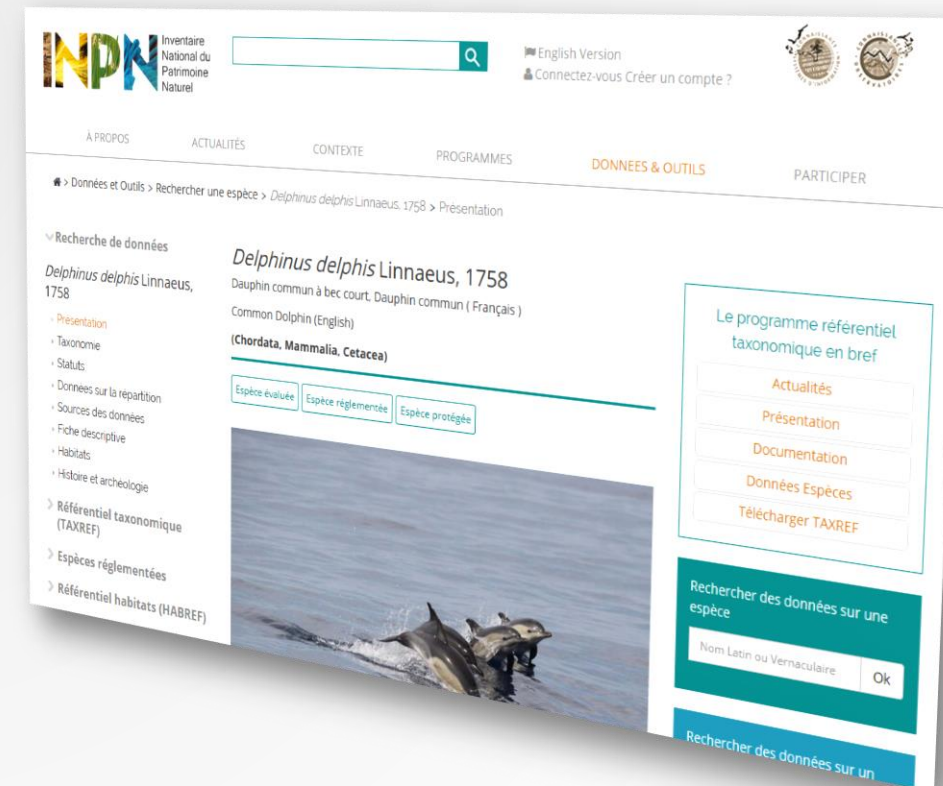
TAXREF

French TAXonomic REference for fauna, flora, fungus maintained by the Muséum National d'Histoire Naturelle.

509,000+ scientific names (living/extinct/exotic)

Mainland France and overseas,
from Paleolithic up to now

Web site, Web service, downloadable text file

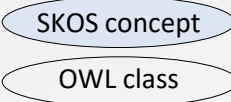
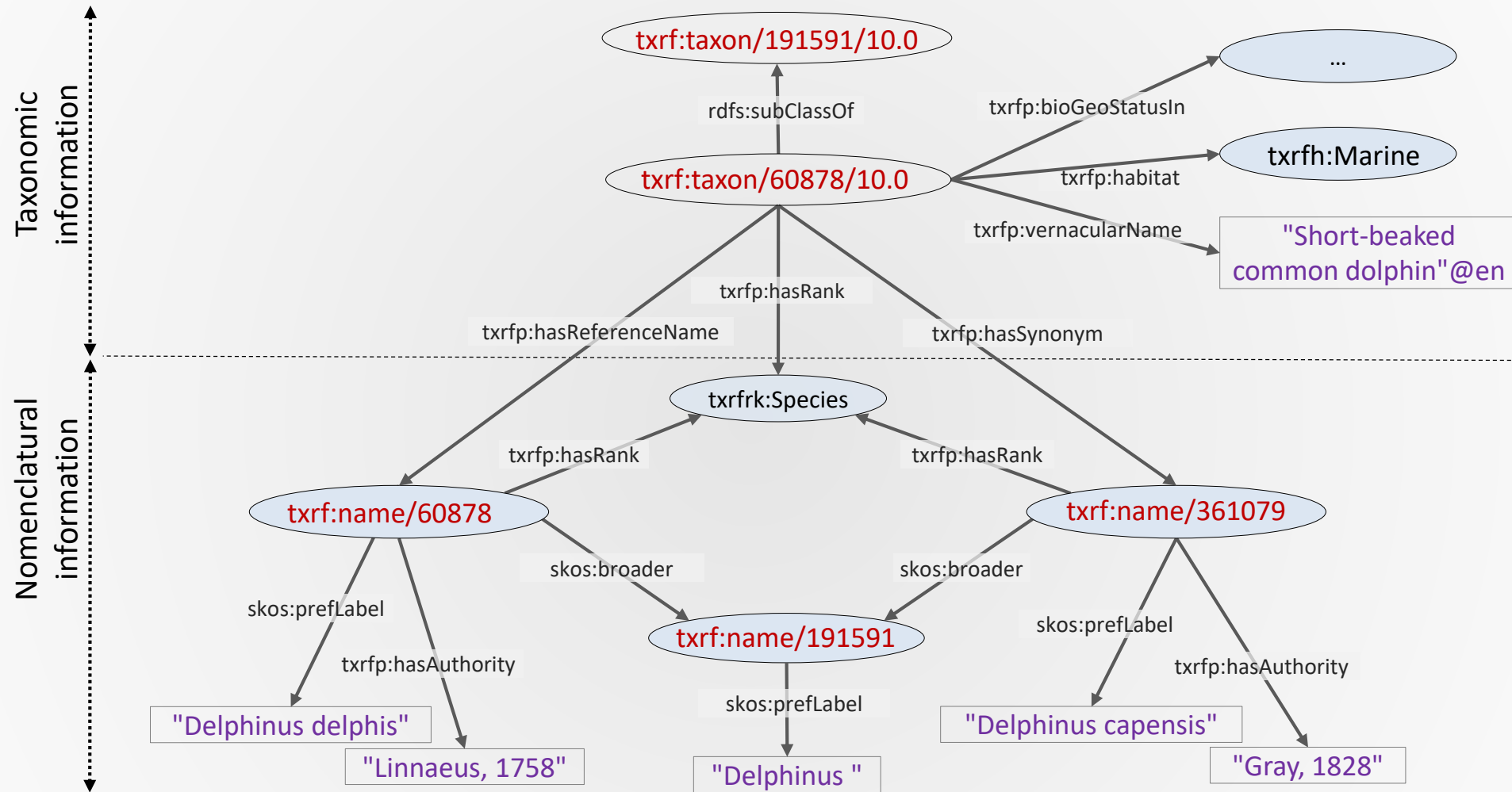


TAXREF-LD: bring TAXREF to the WoD

3 objectives

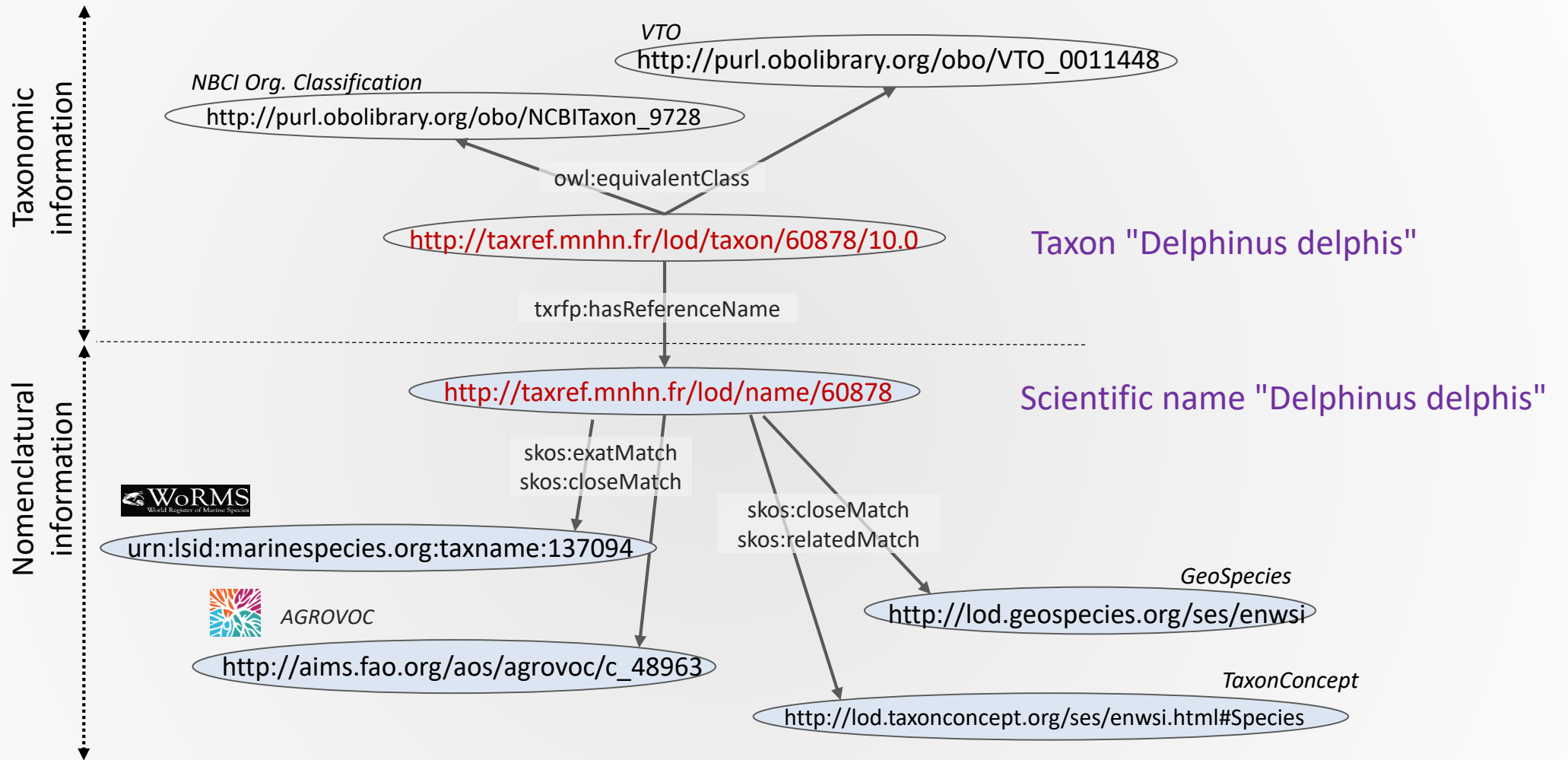
- Relevant to **biologists** (nomenclature vs. taxonomy), compliant with the ethos of **Semantic Web standards**
- Accommodate taxonomic **changes**
- Enable maximum **interlinking** with 3rd party data sets

TAXREF-LD model overview



txrf: <http://taxref.mnhn.fr/lod/>
 txrfrk: <http://taxref.mnhn.fr/lod/taxrank#>
 txrfh: <http://taxref.mnhn.fr/lod/habitat#>
 txrfp: <http://taxref.mnhn.fr/lod/property#>

Interlinking more flexible but still raises questions

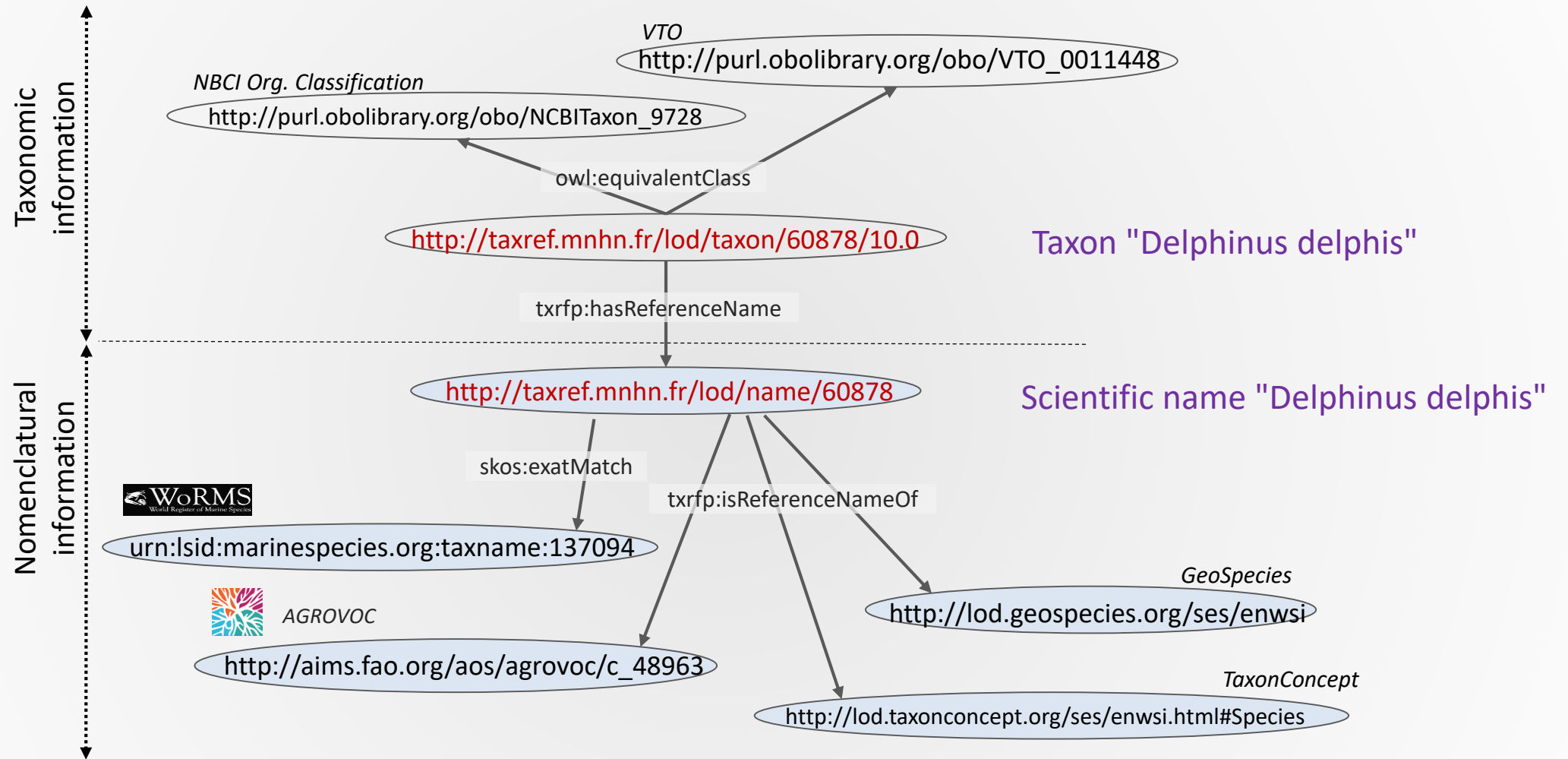


SKOS concept

OWL class

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Check it out!

Delphinus delphis example:

<http://taxref.mnhn.fr/lod/taxon/60878/10.0>

Entry point:

<http://taxref.mnhn.fr/lod/Dataset/10.0/>

Free text search:

<http://erebe-vm2.i3s.unice.fr:8890/fct/>

OPENLINK SOFTWARE

About: Delphinus delphis [Goto](#) [Sponge](#) [NotDistinct](#) [Perma](#)

An Entity of Type : [owl:Class](#), within Data Space : [erebe-vm2.i3s.unice.fr:8890](#)

New Facet based on Instances of this Class

Attributes	Values
rdf:type	Class
equivalentClass	Delphinus delphis Delphinus delphis
label	Delphinus delphis
subClassOf	Delphinus
has reference name	Delphinus delphis
has biogeographical status	Biogeographical status in Guadeloupe Biogeographical status in French Guyana Biogeographical status in Martinique Biogeographical status in Metropolitan France Biogeographical status in French Polynesia »more»
has habitat	Milieu marin
has taxonomic rank	Species
has synonym	Delphinus fulvifasciatus Delphinus fulvofasciatus Delphinus frithii Delphinus janira Delphinus capensis »more»
has vernacular name	Common Dolphin

TAXREF-LD massively linked with 3rd party data sets

TAXREF-LD species/genus automatically aligned with:

267K resources from 6 reference RDF data sets

992K Web pages from 100 scientific databases (*foaf:page*)

Manual alignment of TAXREF-LD classes & properties:

What for: scientific/vernacular names, ranks, habitats, geographical locations...

Sources: DwC, Geonames, TaxonConcept, NCBI Org. Classification, GeoSpecies, ENVO, Relations Ontology, VTO

TAXREF-LD is an **enabler** to...

- Foster data integration scenarios,
- Leverage the WoD to discover information, infer knowledge, answer scientific questions,
- Meet citizen's needs
- etc...

Let's talk!

Read more:

F. Michel, O. Gargominy, S. Tercerie and C. Faron-Zucker. *A Model to Represent Nomenclatural and Taxonomic Information as Linked Data. Application to the French Taxonomic Register, TAXREF*. In Proc. of the S4BioDiv international workshop, Vienne, Austria. CEUR 1933 (2017). <http://ceur-ws.org/Vol-1933/>

