I-ADOPT: Step-by-step guide for creating FAIR variable descriptions using the I-ADOPT Framework

RDA **I**nteroper**A**ble **D**escriptions of **O**bservable **P**roperty **T**erminology WG (I-ADOPT WG)

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I-ADOPT WG

Step-by-step guide

1. Identify components
2. Identify roles
3. Annotate with semantic concepts
4. Provide labels and description
5. Reuse existing or create an identifier reference

1- Identify components

1.a Understand

A clear understanding of what your variable is, what phenomena it relates to or describes, is essential.

- What kind of values does it produce?
- Are they quantitative or qualitative observations?
- What units are usually associated with the variable?
- What methods are typically used to derive the values?

1- Identify components

1.b Analyse

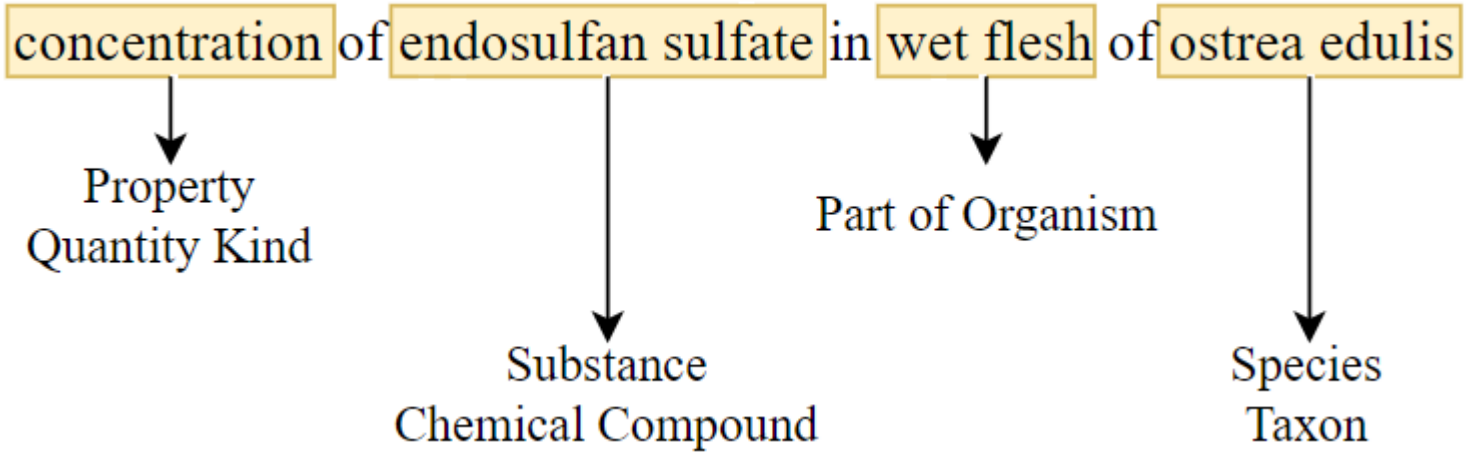
Identify the various components of the description.

concentration of endosulfan sulfate in wet flesh of ostrea edulis

1- Identify components

1.c Generalize

The components are often only specialized variations of more generic concepts - identify what these could be:



2 - Identify roles

2.a Look at associated data

Values and units can give important hints about the property and other components.

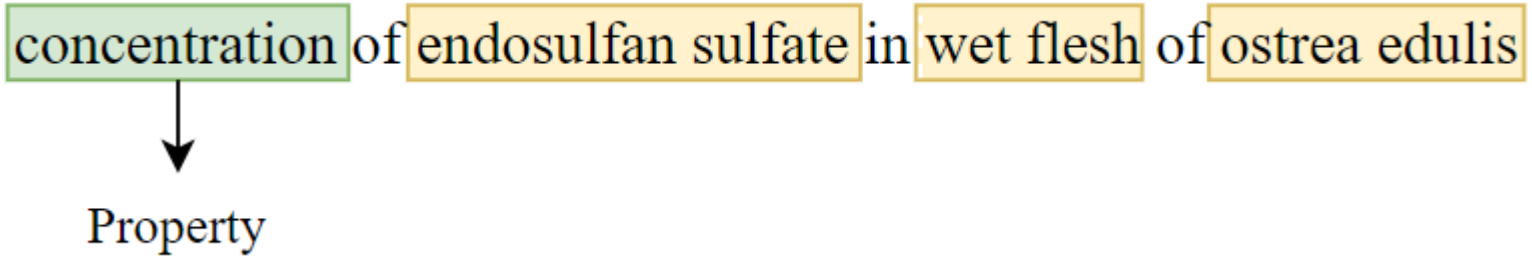
- For **qualitative** variables check the values - are they words, symbols? What do they describe? Are they from known controlled vocabularies?
- For **quantitative** variables check the units - what quantity kind(s) do they represent?

Values of “concentration of endosulfan sulfate in wet flesh of ostrea edulis” are measured, e.g., in micrograms per kilogram.

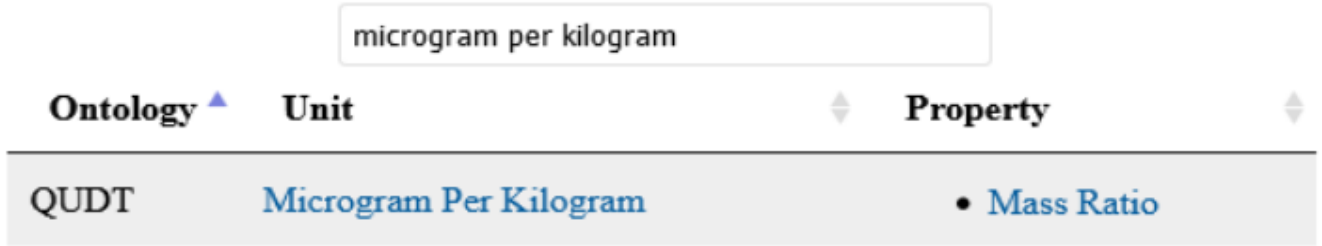
2 - Identify roles

2.b Property

The Property is a generalized characteristic expressed by the value.



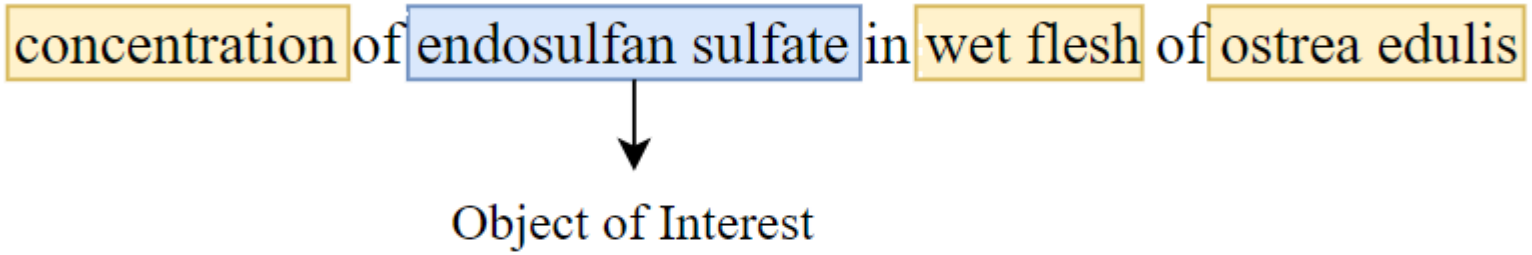
You may use I-ADOPT's Unit-to-Property Lookup to deduce candidate properties from the unit



2 - Identify roles

2.c Object of Interest

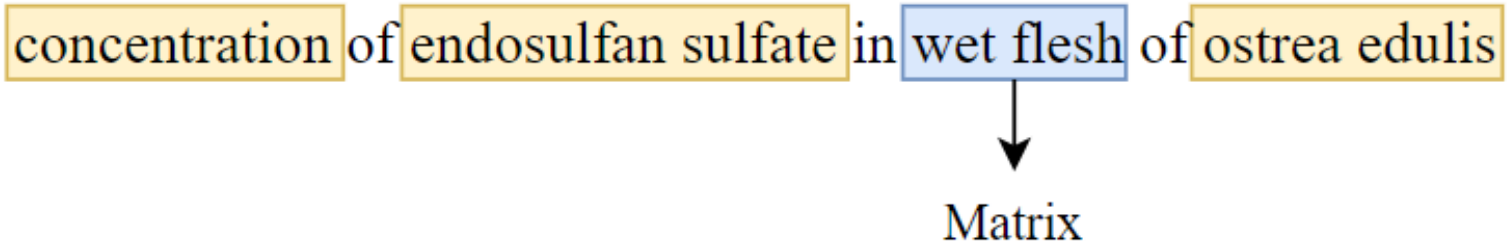
The Object of Interest is the Entity whose Property is observed.



2 - Identify roles

2.d Matrix

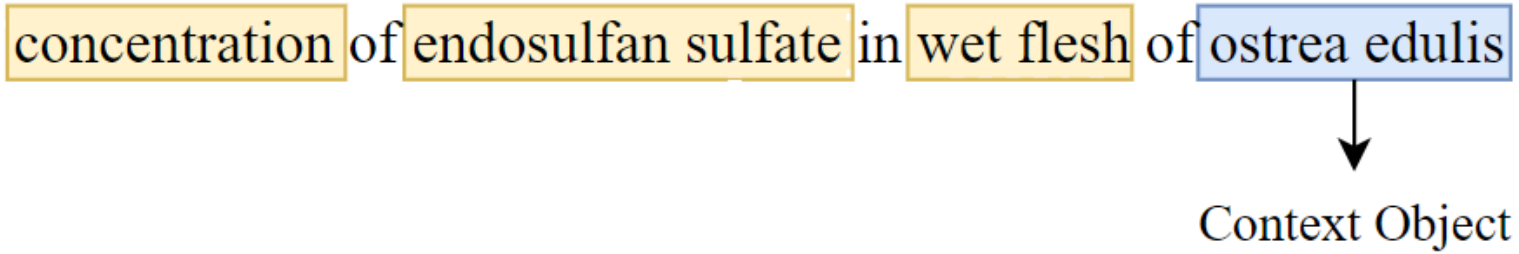
The Matrix of the observation is entity in which the Object of Interest is embedded.



2 - Identify roles

2.e Context of Object(s)

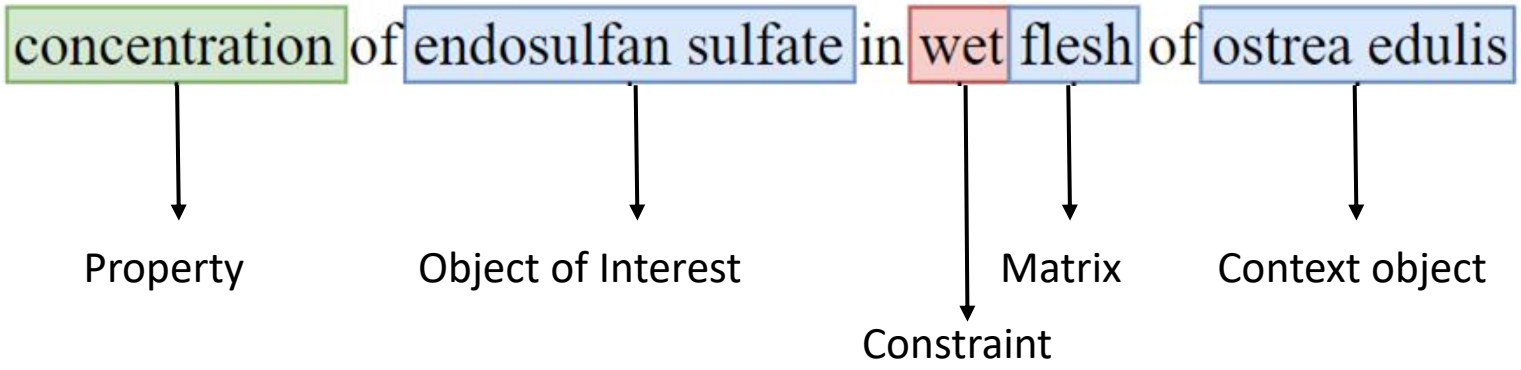
Context Objects are all other Entities needed to describe the Variable.



2 - Identify roles

2.f Further Decompose Entities *(if required)*

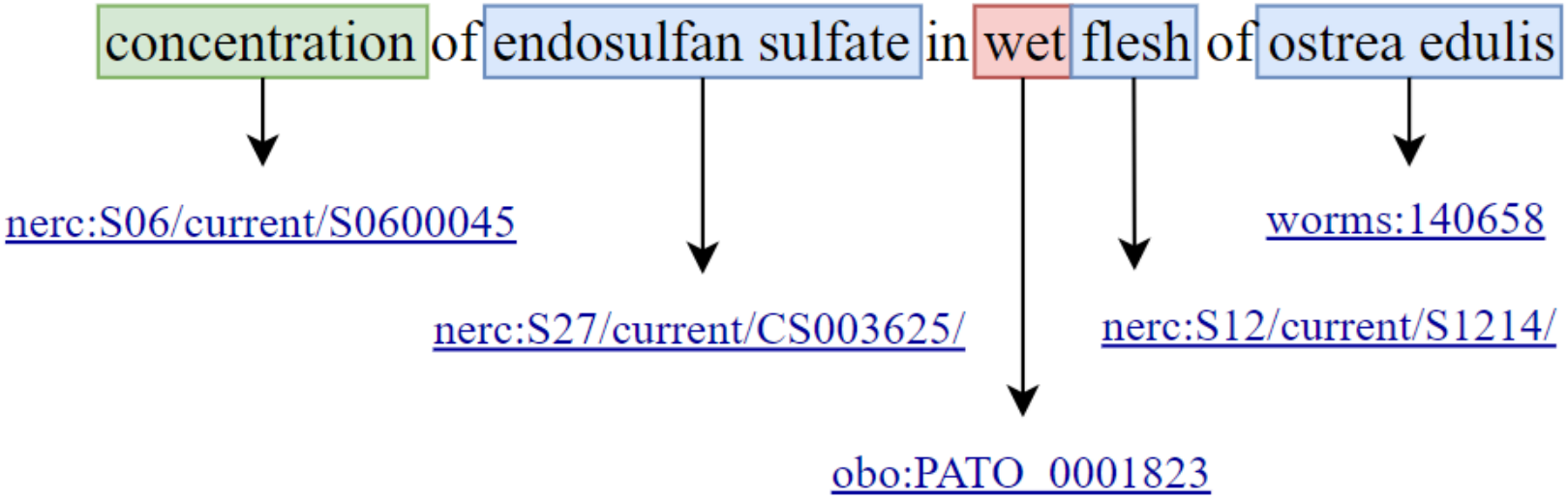
Check whether it is necessary to further decompose the identified entities into more general reusable concepts to constrain their scope in this particular scenario.



3 - Annotate with semantic concepts

3.a Make your variable description machine readable

- Link each component to a concept from a commonly available terminology.
- Find suitable terminologies in the I-ADOPT Catalogue of Terminologies.



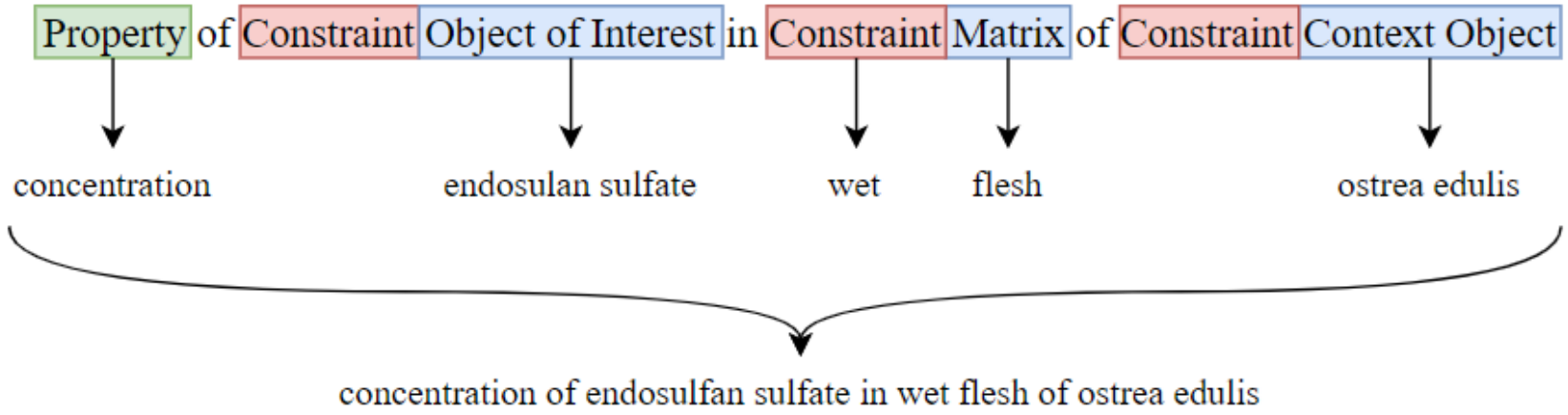
3 - Annotate with semantic concepts

Earth Science Semantic Resources	List of Earth Science vocabulary repositories (includes BioPortal and many others)	http://bit.ly/EarthScienceSemanticResources
BioPortal	List of vocabulary resources from multiple domains (mostly biomedical); CEDAR can use these resources	https://bioportal.bioontology.org
AgroPortal	List of vocabulary resources related to agriculture; many are also in BioPortal	http://agroportal.lirmm.fr
EcoPortal	List of vocabulary resources related to ecology	https://ecoportal.lifewatch.eu/
BiodivPortal	List of vocabulary resources related to biodiversity	https://biodivportal.gfbio.org/
ESIP Community Ontology Repository (COR)	Ontologies related to earth science.	https://cor.esipfed.org
MMI Ontology Registry and Repository (ORR)	Ontologies related to marine science	https://mmisw.org/ont
Linked Open Vocabularies (LOV)	Somewhat idiosyncratic collection of RDF vocabularies on any topic	https://lov.linkeddata.es/dataset/lov/
Basic Register of Thesauri, Ontologies & Classifications	Collected information about vocabularies, terms, and terminology registries to facilitate use of knowledge organization systems.	https://bartoc.org
Linked Open Data Cloud	Source of all graphic images of Linked Open Data resources, this has very limited searching abilities	https://lod-cloud.net/

4 - Provide labels and descriptions

4.a Label the Variable

- Variables can have two or more labels: the preferred label (mandatory) and alternative label(s) (optional)
- Labels should be unique, unambiguous and preferably consistent
- Labels can be constructed with components of the variable and follow a consistent grammar



4 - Provide labels and descriptions

4.b Add a definition

- Provide a concise human-readable text defining the variable
- If necessary, include permanent links to online material with additional contextual information
- The aim of the description is to help humans better understand the variable, its applications and specificity

5 - Reuse or create an identifier reference

5.a Enrich an existing Variable concept (if applicable)

Check whether you can reuse an existing variable and attach the identified components using I-ADOPT references.

5 - Reuse or create an identifier reference

5.b Create a Variable concept

Provide an identifier reference using Linked Data Principles and attach the identified components using I-ADOPT references.

A FAIR variable representation in RDF

Example in turtle (excerpt, see full definition here):

```
@prefix nercP01: <http://vocab.nerc.ac.uk/collection/P01/current/> .
@prefix nercS06: <http://vocab.nerc.ac.uk/collection/S06/current/> .
@prefix nercS12: <http://vocab.nerc.ac.uk/collection/S12/current/> .
@prefix nercS27: <http://vocab.nerc.ac.uk/collection/S27/current/> .
@prefix iadopt:  <https://w3id.org/iadopt/ont/> .
@prefix rdfs:    <http://www.w3.org/2000/01/rdf-schema#> .
@prefix worms:   <http://marinespecies.org/aphia.php?p=taxdetails&id=> .

…
  nercP01:IC000344
  a            iadopt:Variable ;
  rdfs:label   "concentration of endosulfane sulfate in wet flesh of ostrea edulis"@en ;
  iadopt:hasObjectOfInterest  nercS27:CS003625 ;
  iadopt:hasProperty          nercS06:S0600045 ;
  iadopt:hasMatrix            nercS12:S1214 ;
  iadopt:hasContextObject     worms:140658 ;
  iadopt:hasConstraint [
    a           iadopt:Constraint ;
    rdfs:label  "wet"@en ;
    iadopt:constrains nercS12:S1214 ;
  ] ;
  .
```

Acknowledgements and further reading

Created by: GO FAIR Foundation

In collaboration with: RDA RESEARCH DATA ALLIANCE I-ADOPT WG

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