Ontology services for data interoperability

Useful links

**Workshop Page**  
[www.ebi.ac.uk/spot/Workshops](http://www.ebi.ac.uk/spot/Workshops)

**SPOT Ontology Tooling Page**  
[www.ebi.ac.uk/spot/ontology](http://www.ebi.ac.uk/spot/ontology)

**The Ontology Lookup Service (OLS)**  
[www.ebi.ac.uk/ols](http://www.ebi.ac.uk/ols)

**Zooma (Ontology term annotator)**  
[www.ebi.ac.uk/spot/zooma](http://www.ebi.ac.uk/spot/zooma)

**Ontology Xref Service (OxO)**  
[www.ebi.ac.uk/spot/oxo](http://www.ebi.ac.uk/spot/oxo)

**PART I: Data annotation (FAQs)**

What we will try to answer today
[Optional] click on ontology workshop page to click along with us

1. Which ontologies should I use?
2. How do I access ontologies?
3. How do I map data to ontologies?
4. How can I translate from one ontology to another?
5. What about data that doesn’t map?
6. How can I extend an ontology?
7. How do I build “ontology aware” search applications?

How do I access ontologies / Which ontologies should I use?

We will try and answer these questions using the Ontology Lookup Service: [www.ebi.ac.uk/ols](http://www.ebi.ac.uk/ols)

Which ontologies should I use / How do I map data to ontologies?

We will try and answer these questions using Zooma: [www.ebi.ac.uk/spot/zooma](http://www.ebi.ac.uk/spot/zooma)
Copy and paste the below data into Zooma. They are all respiratory system diseases. Your data can be anything, doesn't need to be related to disease!

Age at smoking initiation in chronic obstructive pulmonary disease
Airway responsiveness in chronic obstructive pulmonary disease
Asthma or chronic obstructive pulmonary disease
Body mass in chronic obstructive pulmonary disease
Chronic obstructive pulmonary disease
Crohn's disease and sarcoidosis (combined)
Cystic fibrosis severity
Gene methylation in lung tissue
Idiopathic pulmonary fibrosis
Interstitial lung disease
Lung Cancer (DNA repair capacity)
Lung adenocarcinoma
Lung cancer
Non-small cell lung cancer
Pneumoconiosis in silica exposure
Pulmonary Emphysema
Pulmonary function
Sarcoidosis
Sepsis from pneumonia (survival)
Squamous cell carcinoma
YKL-40 levels
Chronic bronchitis

How can I translate from one ontology to another?

We will try and answer these questions using OxO: [www.ebi.ac.uk/spot/oxo](http://www.ebi.ac.uk/spot/oxo)

Copy and paste the below data into OxO. They are the mappings we managed to find via Zooma for the data above.

http://www.ebi.ac.uk/efo/EFO_0000341
http://www.ebi.ac.uk/efo/EFO_0000341
http://www.ebi.ac.uk/efo/EFO_0000270
http://www.ebi.ac.uk/efo/EFO_0000341
http://www.ebi.ac.uk/efo/EFO_0000341
http://www.orpha.net/ORDO/Orphanet_797
http://purl.obolibrary.org/obo/NCIT_C2975
http://purl.obolibrary.org/obo/NCIT_C33024
PART II: Ontology Tools API session

OLS API

OLS API documentation can be found here: https://www.ebi.ac.uk/ols/docs/api

Common scenarios
- Showing ontology term information in your own application
- Getting labels for a list of terms

Terms API endpoint: Comparing e.g. diabetes mellitus in EFO in the OLS UI and OLS API
https://www.ebi.ac.uk/ols/ontologies/efo/terms?iri=http://www.ebi.ac.uk/efo/EFO_0000400
https://www.ebi.ac.uk/ols/api/ontologies/efo/terms?iri=http://www.ebi.ac.uk/efo/EFO_0000400

What type of id do you have?
If you have an id but you don’t know the format of your id? Our terms lookup endpoint can help
https://www.ebi.ac.uk/ols/api/terms?id=EFO:0000400
https://www.ebi.ac.uk/ols/api/terms?id=EFO_0000400
https://www.ebi.ac.uk/ols/api/terms?id=http://www.ebi.ac.uk/efo/EFO_0000400
Can return multiple hits as terms get re-used in other ontologies. Luckily OLS will redirect you to the correct ontology. In the API we also have defining_ontology = true in the JSON to detect.

**HATEOAS links in the ReSTFUL API**
The json contains "_links" to perform certain action like getting parents of a term

**Common scenarios**
- Finding all parents of a term when building a search index
- Validating a term is a child or another term

https://www.ebi.ac.uk/ols/api/ontologies/efo/terms?iri=http://www.ebi.ac.uk/efo/EFO_0000400

   parents: Link to the direct parent resources for this term
   ancestors: Link to all parent resources for this term
   children: Link to the direct children resources for this term

**OLS search API endpoint**

**Common scenarios**
- Mapping text to ontology terms
- Building a term suggestion service

Search for diabetes: https://www.ebi.ac.uk/ols/api/search?q=diabetes
Restrict to...
   … an ontology https://www.ebi.ac.uk/ols/api/search?q=diabetes&ontology=efo
   … to label https://www.ebi.ac.uk/ols/api/search?q=diabetes&ontology=efo&queryFields=label
   … to exact match https://www.ebi.ac.uk/ols/api/search?q=diabetes&ontology=efo&exact=true

**Additional Query Syntax:**
- exact phrase match "point mutation"
- Boolean queries "point mutation" and "Familial clubfoot" "point mutation" or "Familial clubfoot"
- negation with - e.g. "point mutation" -"Familial clubfoot"
- Partial regex with * gynec*
- fuzzy match with ~ hemopoiesis~ [diff spelling: hemopoiesis vs haemopoiesis]

**SPARQL** access to OLS through the EBI RDF platform (https://www.ebi.ac.uk/rdf/):
- “Get all terms and labels from the Gene Ontology”
- “Get all children of “cellular process” from the Gene Ontology “
- “Find all terms that mention 'alzheimer' in the label”
OxO API

Base URL: [https://www.ebi.ac.uk/spot/oxo/api/](https://www.ebi.ac.uk/spot/oxo/api/)

*Common scenarios*
- Looking up an id for non ontology based resources (e.g. MeSH id)
- Finding mappings between ids

Terms lookup in OxO
Why would I want to do that in OxO and not in OLS? Because OxO includes also resources that are not an ontology (e.g. MeSH) which can not be found in OLS.

**UI** - [https://www.ebi.ac.uk/spot/oxo/terms/EFO:0000400](https://www.ebi.ac.uk/spot/oxo/terms/EFO:0000400)

**API** - [https://www.ebi.ac.uk/spot/oxo/api/terms/EFO:0000400](https://www.ebi.ac.uk/spot/oxo/api/terms/EFO:0000400)

Follow links to get mappings
“Mappings” - [https://www.ebi.ac.uk/spot/oxo/api/mappings?fromId=EFO:0000400](https://www.ebi.ac.uk/spot/oxo/api/mappings?fromId=EFO:0000400)

Doing batch lookups with the search mappings endpoint:
- Specify a target
- Specify a source
- Specify a distance

[https://www.ebi.ac.uk/spot/oxo/api/search?ids=EFO:0000400&mappingTarget=doid&distance=3](https://www.ebi.ac.uk/spot/oxo/api/search?ids=EFO:0000400&mappingTarget=doid&distance=3)

Only find mappings from a particular source e.g. EFO
[https://www.ebi.ac.uk/spot/oxo/api/search?ids=EFO:0000400&mappingTarget=doid&distance=3&mappingSource=EFO](https://www.ebi.ac.uk/spot/oxo/api/search?ids=EFO:0000400&mappingTarget=doid&distance=3&mappingSource=EFO)