

Observation Facilities in the VO

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Why

- The VO can be used to search for observations using the **ObsTAP** or **EPN-TAP** discovery interfaces.
- They use “instrument_host_name” or “facility_name” keywords.

Find Hubble observations of Saturn in Nov. 1997.

VS.

Find HST observations of Saturn in Nov. 1997.

- No official nomenclature/standard for “observation facilities”.
- Need also for better defining what is *observation-facility* VS *instrument*

See previous presentations in IVOA meetings for more details

Connecting with Wikidata

- Wikidata = free and open knowledge base
 - => structured data (export in RDF, JSON)
 - (each item has properties + values)
 - => connected with wikipedia, Wiktionary
- Wikidata can be queried with API and SPARQL
- Wikidata can be edited manually or by API
- For *Observation Facilities*:
 - many identifiers are already connected
 - model/properties are adequate
 - curation / extension is feasible
- IVOA Note ready:
<https://github.com/BaptisteCecconi/ObsFacilityWikidata>

Wikidata record example

The image shows a Wikidata record for the Hubble Space Telescope (Q2513). The record includes a description, a list of labels in multiple languages, and a table of aliases. Annotations with arrows point to specific parts of the page:

- Label:** Points to the Wikidata logo in the top left.
- Wikidata ID:** Points to the ID "Q2513" next to the item title.
- Alias:** Points to the "Also known as" column in the table.
- Property:** Points to the "instance of" label in the statements section.
- Qualifier:** Points to the "space observatory" value in the statements section.

Language	Label	Description	Also known as
English	Hubble Space Telescope	unmanned space telescope launched into outer space by NASA and ESA in April 1990	HST Hubble
French	télescope spatial Hubble	télescope spatial	HST Hubble Space Telescope Hubble télescope Hubble Telescope spatial Hubble Large Space Telescope Télescope spatial Hubble
Spanish	telescopio espacial Hubble	telescopio en órbita alrededor de la Tierra lanzado en 1990	HST Telescopio Hubble Telescopio Espacial Hub... Telescopio espacial Hubble TEH Hubble (telescopio)
German	Hubble-Weltraumteleskop	Weltraumteleskop für sichtbares Licht, Ultraviolett- und Infrarotstrahlung	HST Hubble Space Telescope Hubble-Space-Telescope Hubbteleskop Hubble-Teleskop Hubble

Statements

instance of **space observatory** edit

0 references + add reference

Wikidata record example

Mars Express (Q205672)...

European Mars orbiter
MEX

 edit

► [Recoin: Most relevant properties which are absent](#)

► [In more languages](#)

Statements

instance of

 planetary probe ...

 edit



▼ 0 references

+ add reference

 orbiter ...

relative to

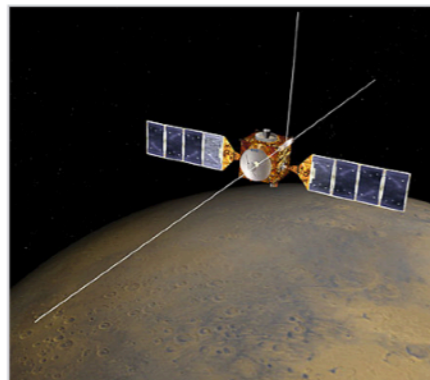
[Mars ...](#)

 edit



▼ 0 references

image



Mars Express illustration highlighting MARSIS antenna.jpg

Identifiers

COSPAR ID

 2003-022A

 edit



► 1 reference

+ add value

NAIF ID

 -41 ...

 edit



► 1 reference

+ add value

NSSDCA ID

 2003-022A

 edit



▼ 0 references

+ add reference

+ add value

Status

- Wikidata contains a lot of already curated information
- Community curated = no control on curation
 - **Decision needed** on storage reference data
 - Curation with current values in IVOA (Registry, ObsTAP, EPN-TAP, see Registry session)
- Extracting observation facilities from Wikidata using a (rather complex) SPARQL query
- Massaging before building reference data:
 - **term** (IVOA style: my-great-observatory)
 - **label** (Human readable: My Great Observatory)
 - **description**
 - **aliases** (acronyms, other languages, other names)
 - **other identifiers** (URI to other reference vocabularies)
- Ingesting into Elasticsearch database
 - **name-resolver**: find a term from a string
 - **aliases**: find all known aliases or identifiers for a term
- Building vocabulary (ongoing)

Importing Wikidata data in Elasticsearch

The screenshot shows the Elasticsearch web interface. The search bar contains 'hst' and the index is 'obsfacility_index'. The search results are displayed in a table with 5 hits. The table has columns for 'label', '_score', and 'aliases'. The results are sorted by '_score' in descending order.

label	_score	aliases
hubble-space-telescope	7.834	[Large Space Telescope, 哈柏太空望遠鏡, 哈勃空間望遠鏡, 哈勃望遠鏡, 哈勃望远镜, 哈勃太空望遠鏡, 哈勃太空望远镜, 哈勃天文望远镜, 哈伯望遠鏡...]
sts-103	6.388	[HST SM-3A, Дискавери STS-103, STS 103, STS 103, STS-103]
sts-82	6.388	[STS 82, HST SM-2, Дискавери STS-82, STS 82, STS-82]
sts-125	5.421	[Дискавери STS-125, Атлантис STS-125, STS 125, HST-SM4, Hubble Space Telescope Servicing Mission 4, HST-SM4, STS-400, ...]
sts-61	5.157	[HST SM-1, Индевор STS-61, STS 61, إس تي 61-61, إس تي 61, STS-61]

Name Resolver for observation facilities

<http://voparis-elasticsearch.obspm.fr/obsfacility/resolve?q=hst>

Examples

<http://voparis-elasticsearch.obspm.fr/obsfacility/resolve?q=hst>

```
{"total": 1, "results": [{"label": "hubble-space-telescope"}]}
```

<http://voparis-elasticsearch.obspm.fr/obsfacility/resolve?q=hubble>

```
{"total": 1, "results": [{"label": "hubble-space-telescope"}]}
```

<http://voparis-elasticsearch.obspm.fr/obsfacility/resolve?q=arecibo>

```
{"total": 3, "results": [{"label": "arecibo-radio-telescope"}, {"label": "arecibo-observatory"}, {"label": "arecibo-12m-radio-telescope"}]}
```

<http://voparis-elasticsearch.obspm.fr/obsfacility/resolve?q=nancay>

```
{"total": 4, "results": [{"label": "nenufar"}, {"label": "nancay-radio-telescope"}, {"label": "nancay-radio-observatory"}, {"label": "nancay-decameter-array"}]}
```

<http://voparis-elasticsearch.obspm.fr/obsfacility/resolve?q=cfht>

```
{"total": 2, "results": [{"label": "canada-france-hawaii-telescope"}, {"label": "new-horizons-kbo-search-cfht"}]}
```


Vocabulary

Label

Description

Wikidata URI

mariner-4	Robotic spacecraft sent by NASA to Mars	http://www.wikidata.org/entity/Q203805
mars-express	European Mars orbiter	http://www.wikidata.org/entity/Q205672
mars-global-surveyor	US spacecraft developed by NASA's Jet Propulsion Laboratory	http://www.wikidata.org/entity/Q206300
2001-mars-odyssey	2001 NASA orbiter studying the geology and hydrology of Mars	http://www.wikidata.org/entity/Q207164
exomars-trace-gas-orbiter	European-Russian Mars orbiter	http://www.wikidata.org/entity/Q2090722
viking-1	space probe sent to Mars	http://www.wikidata.org/entity/Q210199
mars-orbiter-mission-2	proposed Indian Mars orbiter	http://www.wikidata.org/entity/Q21027956

What we get from wikidata:

- using standard schema namespaces and properties (rdfs:label, skos:sameAs...).

```
{
  "@id": "venus-express",
  "rdfs:label": "Venus Express",
  "rdfs:comment": "space probe",
  "skos:sameAs": [
    "Sonda spatiala Venus Express",
    "Venusia Ekspreso",
    "VEx",
  ],
  "skos:exactMatch": [
    "http://www.wikidata.org/entity/Q210889",
    "https://nssdc.gsfc.nasa.gov/nmc/spacecraft/display.action?id=2005-045A",
    "https://naif.jpl.nasa.gov/pub/naif/toolkit_docs/C/req/naif_ids.html#Spacecraft-248"
  ]
},
```

```
{
  "@id": "event-horizon-telescope",
  "rdfs:label": "Event Horizon Telescope",
  "rdfs:comment": "project to create a global interferometric telescope array",
  "skos:sameAs": [
    "Teleskop Horizon Peristiwa",
    "Teleskop Event Horizon",
    "projekt k pozorovani supermasivni cerne diry Sagittarius A*",
    "EHT"
  ],
  "skos:exactMatch": [
    "http://www.wikidata.org/entity/Q3944788"
  ]
},
```

```
{
  "@id": "canada-france-hawaii-telescope",
  "rdfs:label": "Canada France Hawaii Telescope",
  "rdfs:comment": "observatory",
  "skos:sameAs": [
    "CFHT",
    "Canada-France-Hawaii Telescope",
    "Telescope Canada-France-Hawaii",
    "Telescope Canada-France-Hawai",
    "Tcfh",
    "Observatoire Canada-France-Hawaii",
    "Canada-France-Hawaii-Telescope",
    "Canada France Hawaii Telescope",
    "CFHT, Canada France Hawaii Telescope",
    "Canada France Hawaii Telescope, CFHT",
    "Kanadsko-Francouzsko-Havajsky teleskop",
    "Kanadsko-francouzsko-havajsky teleskop",
    "Telescopi de Canada, Franca, Hawaii"
  ],
  "skos:exactMatch": [
    "http://www.wikidata.org/entity/Q1031946",
    "https://minorplanetcenter.net/iau/lists/ObsCodesF.html#T14"
  ]
},
```

Proposed way forward

- next try: a local RDF database extracted from wikidata, and curated (keeping URI link back to wikidata)
 - *Need to keep track of wikidata changes (it is possible to query for updates)*
 - *Better control on terms and updates*
- Set up VEP entry point for managing terms
 - *or use onto-portal prototype (see my linked-data talk)*
- Need coordination/adoption by other alliances/agencies
 - *job for Exec liaison-committee ?*
 - *else move up to IAU ? thoughts ?*

Any questions ?

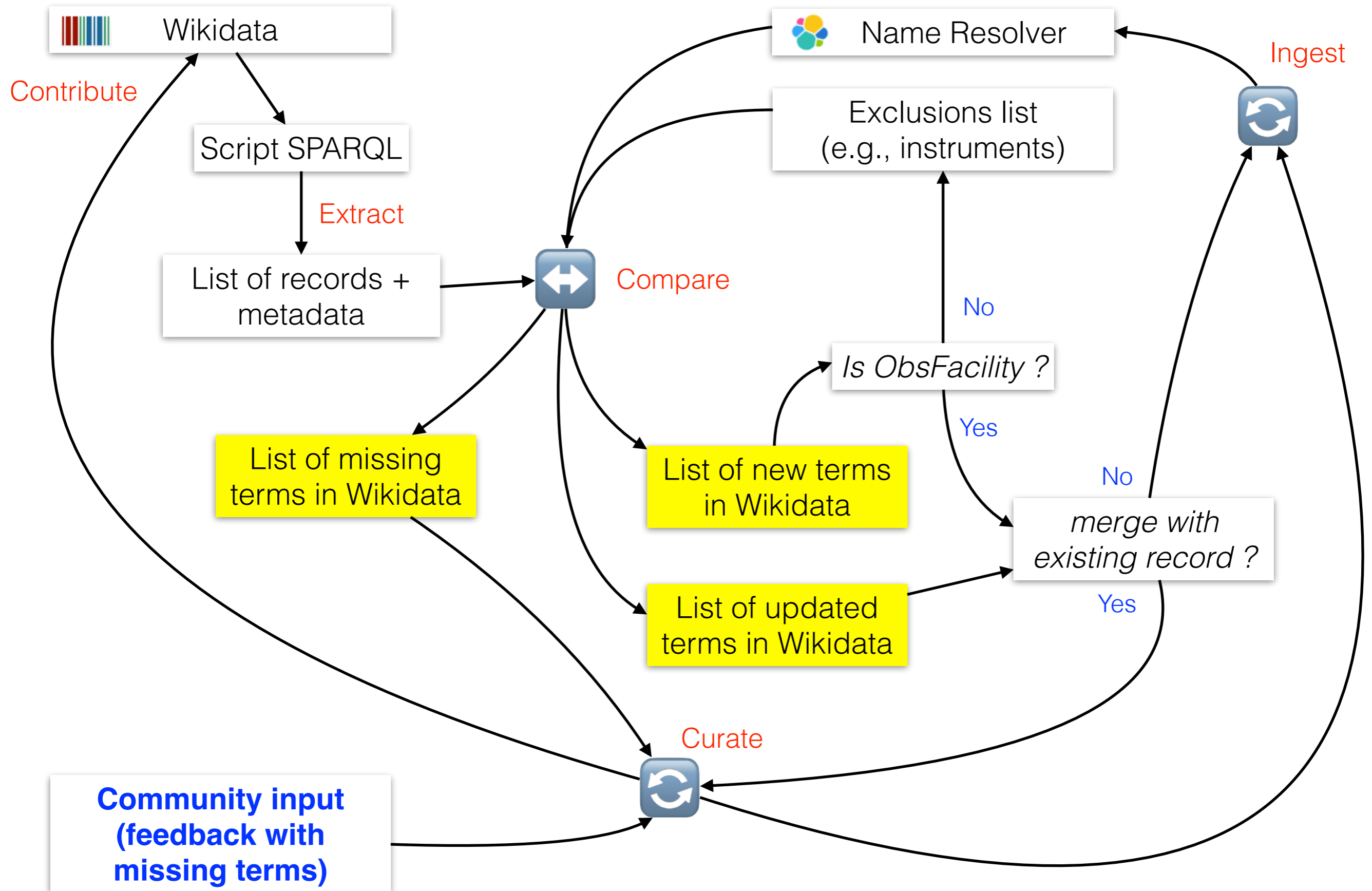
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Maintaining up-to-date information



SPARQL query example



Wikidata Query Service

Exemples

Assistant de requêtes

Aide

Davantage d'outils

français



```
1 PREFIX schema: <http://schema.org/>
2 PREFIX skos: <http://www.w3.org/2004/02/skos/core#>
3 PREFIX wikibase: <http://wikiba.se/ontology#>
4 PREFIX bd: <http://www.bigdata.com/rdf#>
5 SELECT
6   ?item
7   ?itemLabel
8   (GROUP_CONCAT(DISTINCT ?alias; SEPARATOR="|") AS ?aliases)
9 WHERE
10 {
11   ?item p:P31 ?stat .
12   #item instance of
13   {?stat ps:P31 wd:Q148578 .} # space observatory
14   OPTIONAL {?item skos:altLabel ?alias .}
15   SERVICE wikibase:label { bd:serviceParam wikibase:language "[AUTO_LANGUAGE],en". }
16 }
17 GROUP BY ?item ?itemLabel
```



147 résultats en 1109ms

Code

Télécharger

Lien

item	itemLabel	aliases
wd:Q19764	Astron	
wd:Q48633	Corot	CoRoT Convection Rotation and Planetary Transits CONvection ROTation and planetary Transits Convection, Rotation and planetary Transits CoRoT コロト衛星 COROT space telescope CONvection ROTation and planetary Transits
wd:Q49694	EXOSAT	Sat European X-ray Observatory Satellite

SPARQL query example

Search for “Hubble”

Q wd:Q2463	Advanced Composition Explorer	ACE ACE Explorer 71 高級成分探測器
Q wd:Q2513	télescope spatial Hubble	HST HST HST HST HST Hubble Hubble Hubble 허블 HST متتبع لآبلس متتبع لآبلس متتبع لآبلس متتبع لآبلس متتبع لآبلس متتبع لآبلس متتبع لآبلس متتبع لآبلس Hubble HST مقراب هابل الفضائي تليسكوبي هابل Hubble Space Telescope Hubble-teleskopet Hubble Space Telescope Hubble-Space-Telescope Hubble-Teleskop Hubbleteleskop Hubble (telescopio) TEH Telescopio espacial Hubble Telescopio Espacial Hubble Telescopio Hubble Hubble Space Telescope Large Space Telescope télescope Hubble Telescope spatial Hubble Télescope spatial Hubble Hubble-Weltraumteleskop Hubble Space Telescope Telescopio Hubble Telescopio orbitale Hubble Hubble ruimtetelescoop Hubble Space Telescope Hubble-ruimtetelescoop Hubble-telescoop Hubbletelescoop HST Hubble Space Telescope космический телескоп «Хаббл» космический телескоп имени Хаббла КТХ телескоп имени Хаббла Hubbleteleskopet
Q wd:Q14918	ABRIXAS	A Broadband Imaging X-ray All-Sky Survey ABRIXAS A BRoad-band Imaging X-ray All-sky Survey A Broadband Imaging X-ray All-sky Survey
Q wd:Q14951	AGILE	Astrorivelatore Gamma ad Immagini LEggero

Previous works

- Fuzzy-logic tool for matching lists, developed by Graz team (EPN2020RI project):
<https://github.com/eptn-vespa/FacilityList>
- Prototype at IMCCE, using their Quaero search engine. Example:
<https://api.ssodnet.imcce.fr/quaero/1/sso/ACE>
- CDS Telescope/Instrument database for Vizier
- NASA/PDS4 information model: “context product” with identifier, related products and metadata

Maintaining up-to-date information

Updating Wikidata:

- Refresh Observation Facilities lists
- Update Wikidata Extract
- Check for missing information
- Contribute

Updating the name resolver:

- Make a new Wikidata extract
- Verify changes before transitioning ?
- > Develop sanity/regression Tests ?
- Import into Elastic Search