Observation Facilities in the VO

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Why

- **ObsTAP** / **EPN-TAP / PDAP** have “instrument_host_name” or “facility” keywords. For efficient data mining, a standardization of such nomenclature is needed.

- *The same is true for target names: EPNcore is requiring that IAU names are used for bodies in the solar system.*

- There is no official nomenclature/standard for “observation facilities” names.

Observation Facilities

- Need for a standard nomenclature for observation facilities (observatories, spacecraft…) and instruments (telescopes, experiments, instruments).

- Use cases
  - data discovery (EPN-TAP, ObsTAP)
  - data tagging (VizieR)

- Several lists identified (some are several hundred items). Merging is tedious by hand or programmatically.
  > Personnel hired in Paris for this task (start Jan. 2022)

Some of the available lists

List	Facility Type	number of Records
NSSDC	space	7203
NASA/NAIF	space	196
NASA/PDS	space	50+
SPASE	space + ground	215
SANA	space	1053
AAS	ground	417
Harvard/ADS	ground	257
IRAF	ground	58
IAU/MPC	ground	1864
Xephem	ground	461
WMO/Oscar	space	683
WISERep (telescopes)	ground	108

More: https://github.com/epn-vespa/FacilityList/tree/master/data

Previous works

- Fuzzy-logic tool for matching lists, developed by Graz team (EPN2020RI project): https://github.com/epn-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

VOFacility
as an extension of VOResource

- Extension of VOResource with addition of:
  <alternateName> + “namingAuthority” attribute

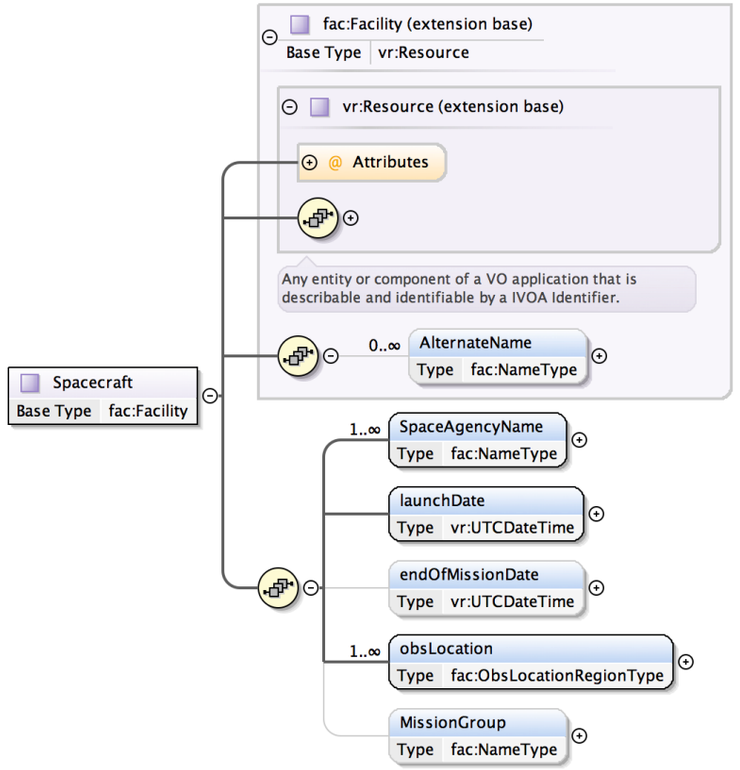
```
<title>Cassini</title>
<alternateName>CASSINI</alternateName>
<alternateName>Cassini Orbiter</alternateName>
<alternateName namingAuthority="naif">-82</alternateName>
<alternateName namingAuthority="nssdc">1997-061A</alternateName>
<alternateName namingAuthority="pds">co</alternateName>
```

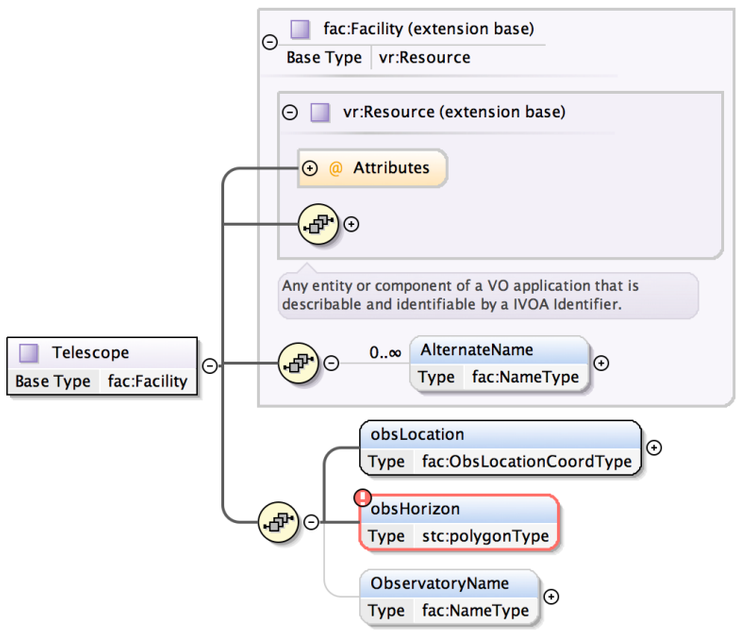
- **Spacecraft** = extension of Facility with:
  + LaunchDate + EndOfMissionDate
  + SpaceAgencyName + MissionGroup +
  + ObsLocation [ObsRegion + TimeInterval [StartTime + StopTime]]

- **Telescope** = extension of Facility with:
  + ObservatoryName
  + ObsLocation [long,lat,alt]
  + ObsHorizon [polygon]

- Next: Add Instruments with references to Facilities.

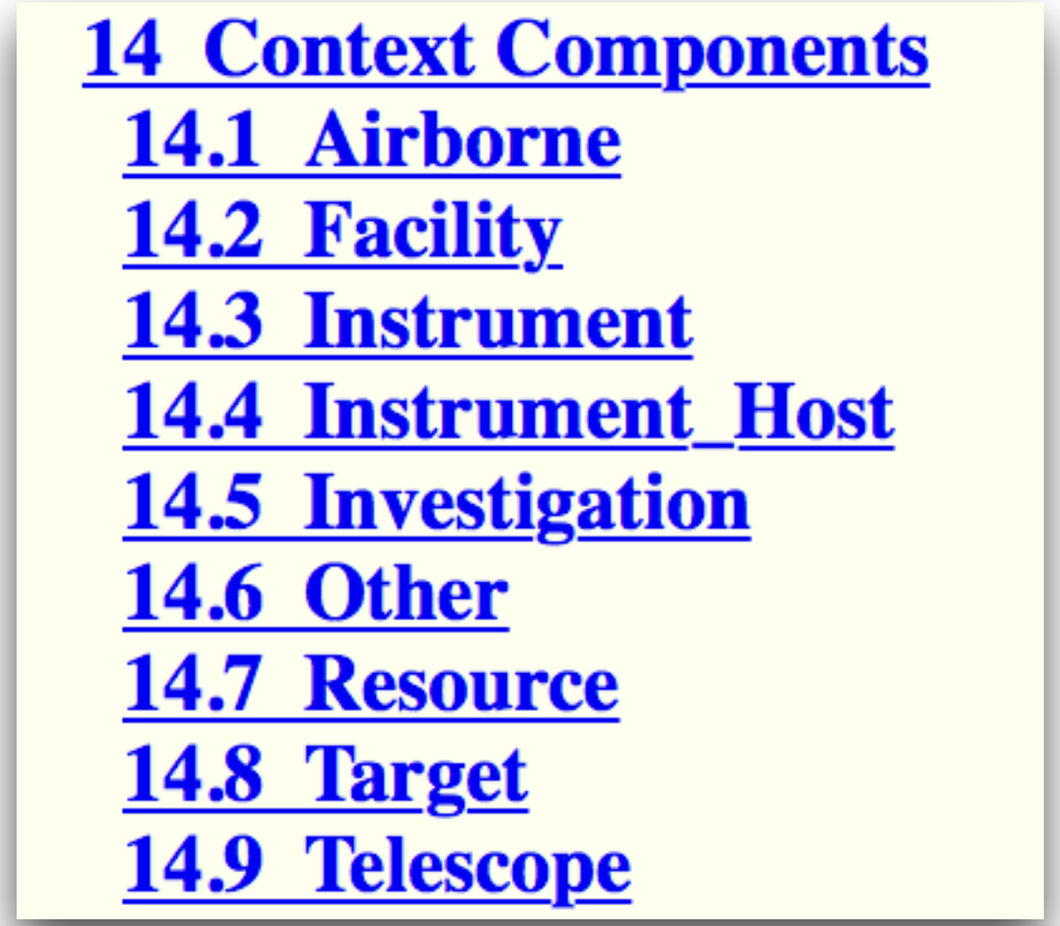
- Next-next:FieldAnalog, Laboratory Experiment and Numerical Experiment





PDS4 information model

- NASA/PDS v4 information model (IM) has conceptual elements and links for observation facilities and instruments, as part of their “Context Products” description



- NB: we used version 1.8.0.0 https://pds.jpl.nasa.gov/datastandards/documents/im/

Goals

- Use case A: Data discovery
  - step 1: define what is stored (observatory/telescope/space mission/ spacecraft…), and if relations are needed (e.g., telescope to observatory)
  - step 2: match lists and catalogues, build a lookup table with alternate names
  - step 3: define maintenance procedure
  - step 4: build a name resolver for data discovery clients, or to help provider to select a name

- Use case B: Data tagging
  - step 1: define model for metadata to be stored and check if mapping is possible with outcome use case A
  - step 2: build reference database
  - step 3: define maintenance procedure (how to involve facility managers)
  - step 4: propose interface for wider use ?

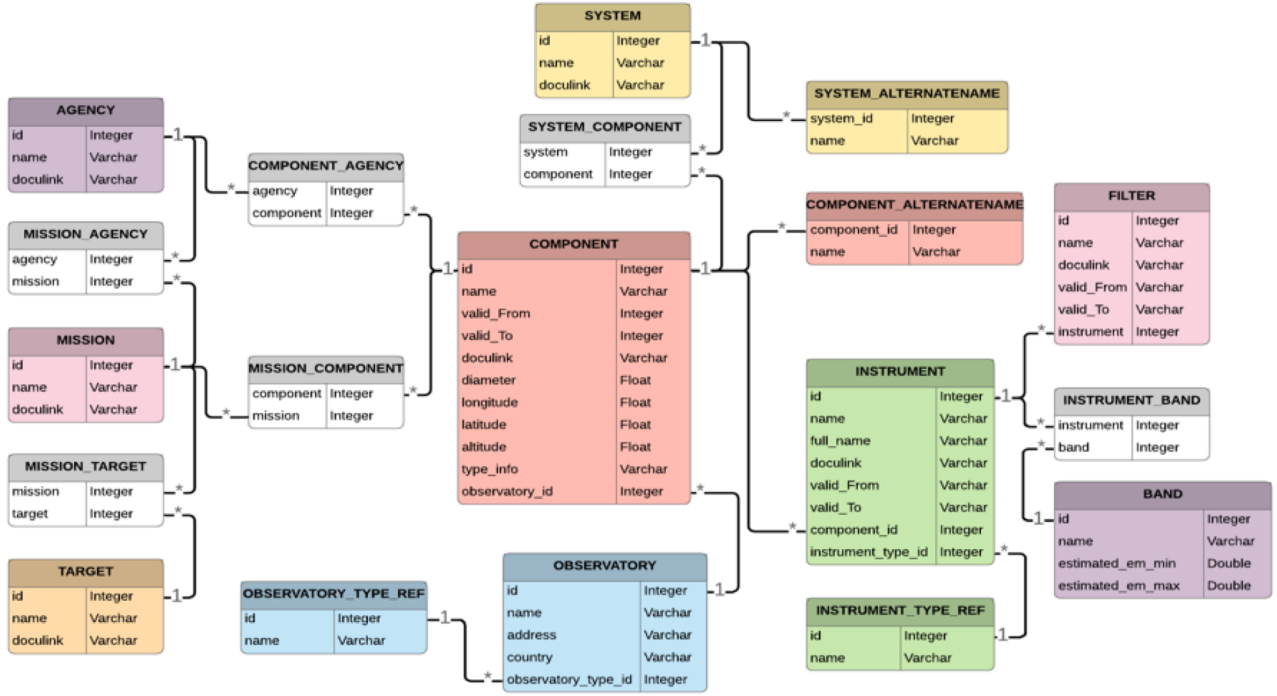
Goals for an instrumental index

- Various needs to track names and properties of the instruments and telescopes
- For publication and curation
  - Tag articles in astronomical journals
  - Check tool for documentalists ingesting data and tables (e.g Vizier)
- For data discovery and data analysis
  - data provider/user Obscore metadata , Instrument configuration as part of Provenance, etc .
- For evaluating the usage of instrument/telescope
  - Agencies , e.g. ESO

Experience with a TAP Prototype for a Telescope-Instrument repository

Data model implementation in PostGres

- TAP service developed in spring 2019
- Test of the DB via a TAP interface : TOPCAT, TapHandle
- Data base feed :
  - development of an update interface for multiple contributors
- Feedback :
  - Need much man power ingestion/maintenance
  - Is the model adequate and how many revision cycles will we have to sustain?



DB Prototype 2019
Based on PDS4 classes and documentalist experiences list

What are the needs

- Agreed it is useful to have a global information system
- Define a Unique ID for each component
- Represent hierarchical relations Instrument/Telescope/Observatory
- Bind the ID to some description record
- Gather content from the expertise of various partners : agencies, publishers, data centers, librarians and documentalists

Future steps

- How far do we want to be complete?
  - Different needs imply different metadata profiles
- Should we define a distributed system among various parters
  - With a minimal core of metadata
    - Identifiers , minimal properties and landing page
  - Design crosswalks if needed

Comments , suggestions?

Thanks