How to find the origin of VizieR tables in the VO?

G.Landais,

and VizieR team !

Providing Data origin

GO Fair principle guideline (EOSC)

Findable

The first step in (re)using data is to find them. Metadata and data should be easy to find for both humans and computers. Machine-readable metadata are essential for automatic discovery of datasets and services, so this is an essential component of the FAIRification process.

F1. (Meta)data are assigned a globally unique and persistent identifier.

F2. Data are described with rich metadata (defined by R1 below).

F3. Metadata clearly and explicitly include the identifier of the data they describe.

F4. (Meta)data are registered or indexed in a searchable resource.

Accessible

Once the user finds the required data, she/he/they need to know how they can be accessed, possibly including authentication and authorisation.

A1. (Meta)data are retrievable by their identifier using a standardised communications protocol.

A1.1 The protocol is open, free, and universally implementable.

A1.2 The protocol allows for an authentication and authorisation procedure, where necessary.

A2. Metadata are accessible, even when the data are no longer available.

Interoperable

The data usually need to be integrated with other data. In addition, the data need to interoperate with applications or workflows for analysis, storage, and processing.

I1. (Meta)data use a formal, accessible, shared, and broadly applicable language for knowledge representation.

I2. (Meta)data use vocabularies that follow FAIR principles.

I3. (Meta)data include qualified references to other (meta)data.

Reusable

The ultimate goal of FAIR is to optimise the reuse of data. To achieve this, metadata and data should be well-described so that they can be replicated and/or combined in different settings.

R1. (Meta)data are richly described with a plurality of accurate and relevant attributes.

R1.1. (Meta)data are released with a clear and accessible data usage license.

R1.2. (Meta)data are associated with detailed provenance.

R1.3. (Meta)data meet domain-relevant community standards.

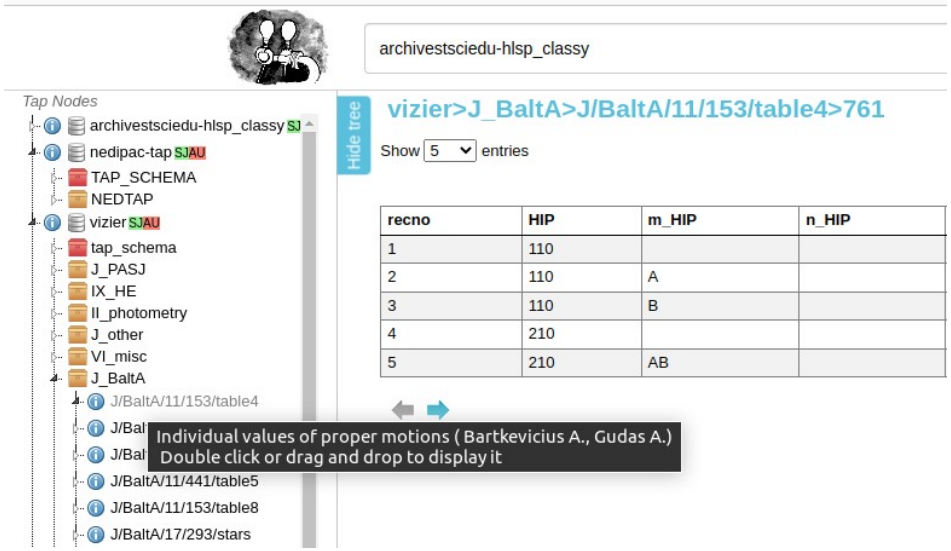
doi Approved !

VO Approved !

Providing Data origin

Importance of Data origin especially in a virtual network

- Needed in Open science
- Enough metadata to understand data :
  - To be understood by end-users
  - To be interoperable
  - To create an interconnected network using references
  - To be cited



Origin meta-data for published resources

- Authors, curator, provider
- References:
  - Link to original data
  - Link to related resources
    eg: articles or any resources used
- Transformation/update (eg: selection of columns, added values)
- Years of publication, last release, etc.
- (Licenses ?)

Origin in landing page

Portal Simbad VizieR Aladin X-Match Other Help

Virgo Filaments. I. CO and HI data : J/A+A/657/A9

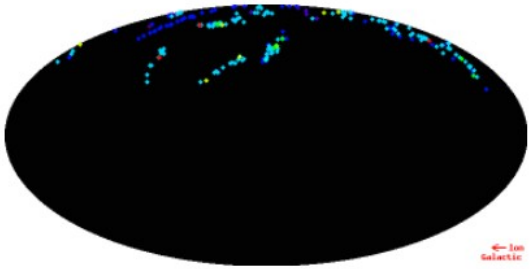
Access to VizieR FTP ReadMe TAP Xmatch

Authors : Castignani G. , Combes F., Jablonka P., Finn R.A., Rudnick G., Vulcani B., Desai V., Zaritsky D., Salome P. (hide)

VizieR DOI : 10.26093/cds/vizier.36570009 Cite
Bibcode : 2022A&A...657A...9C (ADS)

UAT : CO line emission, Radio spectroscopy, Galaxies, Galaxy clusters, H I line emission

Observation (OC)



Inserted into VizieR : 22-Dec-2021
Last modification : 21-Mar-2022

Article Origin | Description | Prov | FTP | VizieR

Virgo Filaments. I. Processing of gas in cosmological filaments around Virgo cluster. (2022)
Go to the original article (10.1051/0004-6361/202040141)

Keywords : galaxies clusters: general - galaxies: star formation - molecular data - ISM: general

Abstract: It is now well established that galaxies have different morphology, gas content and star formation rate in dense environments like galaxy clusters. The impact of environmental density extends to several virial radii, and galaxies appear to be pre-processed in filaments and groups, before falling into the cluster. Our goal is to quantify this pre-processing, in terms of gas content, and star formation rate, as a function of density in cosmic filaments. We have observed the two first CO transitions in 163 galaxies with the IRAM-30m telescope, and added 82 more measurements from the literature, for a sample of 245 galaxies in the filaments around Virgo cluster. We gathered HI-21cm measurements from the

Astronomy and Astrophysics policies

Cite the VizieR catalogues (Authors, Data and VizieR service)

Cite VizieR catalogue

J/A+A/657/A9 (Castignani G.)

Cite the catalogue (data) and the VizieR service
Bibtex

```
@MISC{vizier:J/A+A/657/A9,
  author={Castignani G., Combes F., Jablonka P., Finn R.A., Rudnick
G., Vulcani B., Desai V., Zaritsky D., Salome P.},
  title = {Virgo Filaments. I. CO and HI data},
  year={2022},
  eid = {J/A+A/657/A9},
  doi={10.26093/cds/vizier.36570009}
}
```

Cite VizieR

To find Data origin in the VO

Where to provide origin metadata in the VO ?

- **VO registry**
  - Identifiers, authors, data origin (article)
  - References to other resources
- **ProvDM**
  - Ingestion Workflow
- **VOTable**
  - No “standard” provenance information : DOI/bibcodes, authors…
- **In Protocols?**
  - TAP ? Scs ? Etc.

Origin in the registry

Example of Vizier catalogue in VO registry

```
<title>ROXA: multi-frequency large sample of blazars</title>
<shortName>J/A+A/472/699</shortName>
<identifier>ivo://CDS.VizieR/J/A+A/472/699</identifier>
<altIdentifier>doi:10.26093/cds/vizier.34720699</altIdentifier>
<curation>
  <publisher ivo-id="ivo://CDS">CDS</publisher>
  <creator>
    <name>Turriziani S.</name>
  </creator>
  <creator>
    <name>Cavazzuti E.</name>
  </creator>
  <creator>
    <name>Giommi P.</name>
  </creator>
  <date role="Updated">2017-10-13T15:41:40Z</date>
  <date role="Created">2007-11-11T15:44:53Z</date>
```

Metadata available in pyVO !

authors, pub. **date**

```
<subject>Active galactic nuclei</subject>
<subject>BL Lacertae objects</subject>
<subject>Quasars</subject>
<description>Although Blazars are a small fraction of the overall AGN population they are
expected to be the dominant population of extragalactic sources in the hard X-ray and gamma-ray
bands and have been shown to be the largest contaminant of CMB fluctuation maps. So far the
number of known blazars is of the order of several hundreds, but the forthcoming AGILE, GLAST
and Planck space observatories will detect several thousand of objects of this type. In
preparation for these missions it is necessary to identify new samples of blazars to study their
discovery of new High Energy Peaked BL Lac (HBLs).Our catalog therefore includes many new
potential targets for GeV-TeV observations.</description>
<source format="bibcode">2007A&A...472..699T</source>
<referenceURL>https://cdsarc.cds.unistra.fr/viz-bin/cat/J/A+A/472/699</referenceURL>
```

Reference to **article**

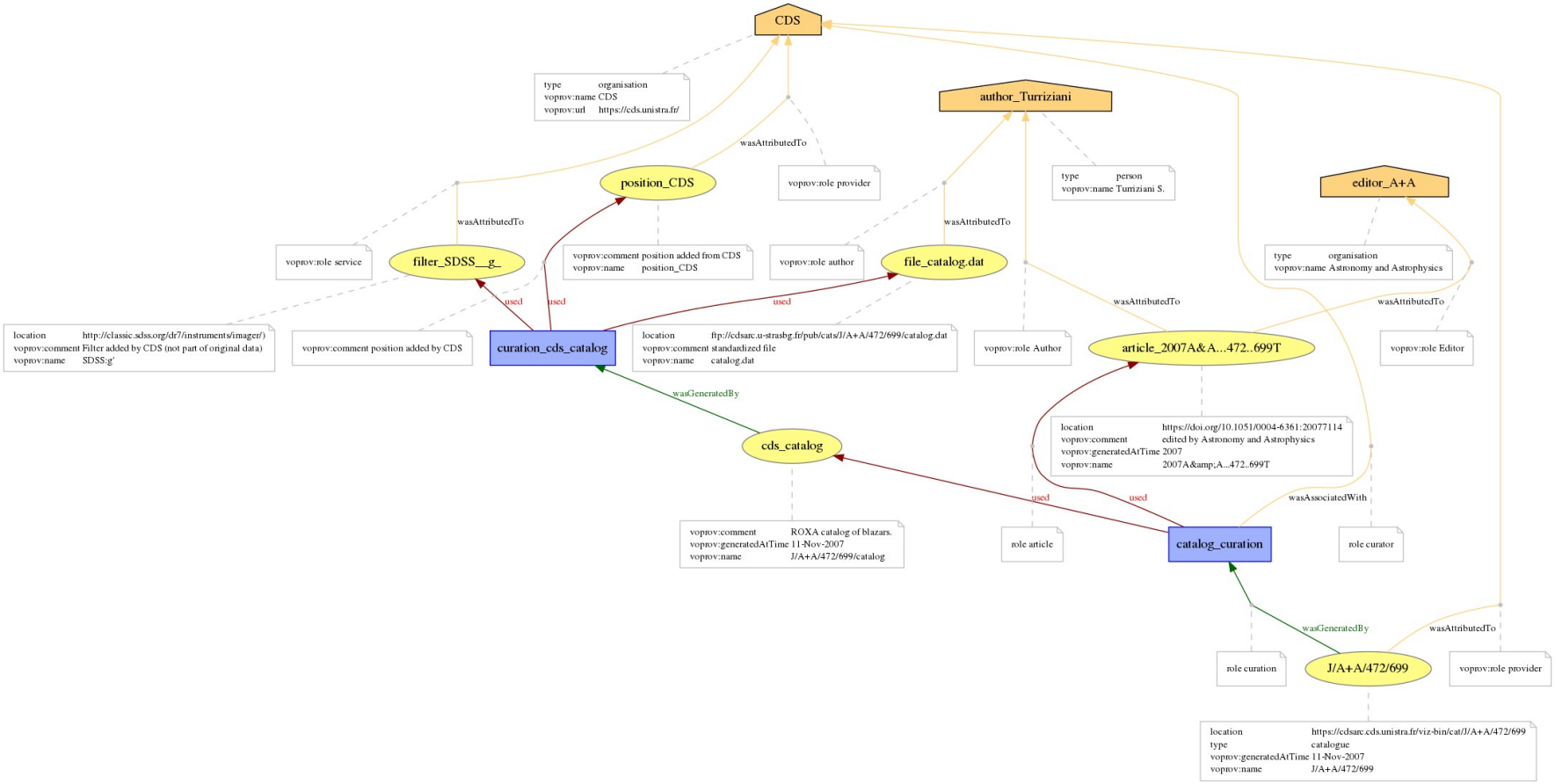
References given by authors in the article and which are in VizieR database

```
<relationship>
  <relationshipType>related-to</relationshipType>
  <relatedResource ivo-id="ivo://CDS.VizieR/VIII/65">VIII/65 : 1.4GHz NRAO VLA Sky Survey (NVSS) (Condon+ 1998)</relatedResource>
  <relatedResource ivo-id="ivo://CDS.VizieR/IX/29">IX/29 : ROSAT All-Sky Survey Faint Source Catalog (Voges+ 2000)</relatedResource>
  <relatedResource ivo-id="ivo://CDS.VizieR/IX/10">IX/10 : ROSAT All-Sky Bright Source Catalogue (1RXS) (Voges+ 1999)</relatedResource>
  <relatedResource ivo-id="ivo://CDS.VizieR/II/276">II/276 : The SDSS Photometric Catalog, Release 5 (Adelman-McCarthy + 2007)</relatedResource>
  <relatedResource ivo-id="ivo://CDS.VizieR/VII/226">VII/226 : The 2dF Galaxy Redshift Survey 100k Data Release (2dFGRS Team, 2001)</relatedResource>
  <relatedResource ivo-id="ivo://CDS.VizieR/VII/241">VII/241 : The 2dF QSO Redshift Survey (Croom+ 2004)</relatedResource>
  <relatedResource>ATCAPMN : http://www.atnf.csiro.au/resources/catalogues/pmn_atca</relatedResource>
</relationship>
```

Origin and Provenance

ProvDM

- An advanced mode dedicated for workflow
- Explain relations, roles between resources and agents



Origin in VOTable

- VOTable returned by a conesearch (SCS)

```
▼<VOTABLE xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
 xmlns="http://www.ivoa.net/xml/VOTable/v1.1" version="1.1"
 xsi:schemaLocation="http://www.ivoa.net/xml/VOTable/v1.1
 http://www.ivoa.net/xml/VOTable/v1.1">
  <DESCRIPTION> VizieR Astronomical Server vizier.u-strasbg.fr Date: 2022-04-21T16:49:34
  [V1.99+ (14-Oct-2013)] Explanations and Statistics of UCDs: See LINK below In case of
  problem, please report to: cds-question@unistra.fr In this version, NULL integer columns
  are written as an empty string <TD></TD>, explicitely possible from VOTable-1.3
  </DESCRIPTION>
  <!--  VOTable description at http://www.ivoa.net/Documents/latest/VOT.html  -->
 ▼<DEFINITIONS>
    <COOSYS ID="J2000" system="eq_FK5" equinox="J2000"/>
  </DEFINITIONS>
  <INFO ID="VERSION" name="votable-version" value="1.99+ (14-Oct-2013)"/>
  <INFO ID="Ref" name="-ref" value="VOTx4074306"/>
  <INFO name="MaxTuples" value="50000"/>
 ▼<RESOURCE ID="yCat_34720699" name="J/A+A/472/699">
   <DESCRIPTION>ROXA: multi-frequency large sample of blazars (Turriziani+, 2007)
   </DESCRIPTION>
  ▼<TABLE ID="J_A_A_472_699_catalog" name="J/A+A/472/699/catalog">
     <DESCRIPTION>ROXA catalog of blazars.</DESCRIPTION>
     <!--  Definitions of GROUPs and FIELDs  -->
    ▼<FIELD name="recno" ucd="meta.record" datatype="int" width="8">
       <!--  ucd="RECORD"  -->
       <DESCRIPTION>Record number assigned by the VizieR team. Should Not be used for
       identification.</DESCRIPTION>
     </FIELD>
    ▼<FIELD name="ROXA" ucd="ID_MAIN" datatype="char" arraysize="18*">
       <!--  ucd="meta.id;meta.main"  -->
       <DESCRIPTION>Source name (JHHMMSS.s+DDMMSS.s) [datatype=char]</DESCRIPTION>
     </FIELD>
    ▼<FIELD name="z" ucd="src.redshift" datatype="float" width="5" precision="2">
       <!--  ucd="REDSHIFT_HC"  -->
       <DESCRIPTION>Redshift</DESCRIPTION>
     </FIELD>
    ▼<FIELD name="Bjmag" ucd="phot.mag;em.opt.B" datatype="float" width="4" precision="1"
     unit="mag">
       <!--  ucd="PHOT_PHG_BJ"  -->
       <DESCRIPTION>? Bj magnitude (from 2dF surveys)</DESCRIPTION>
       <VALUES null="NaN"/>
     </FIELD>
    ▼<FIELD name="g'mag" ucd="phot.mag;em.opt.B" datatype="float" width="4" precision="1"
     unit="mag">
```

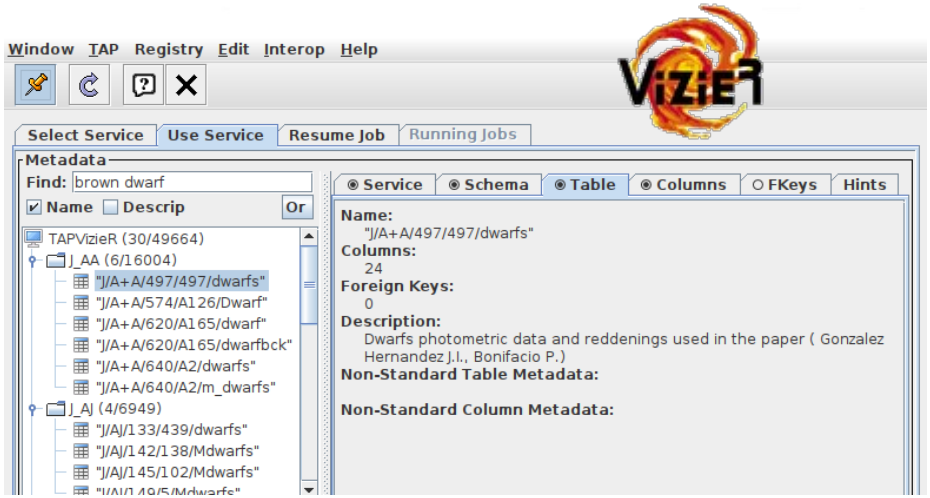
NO DOI ,
NO bicode

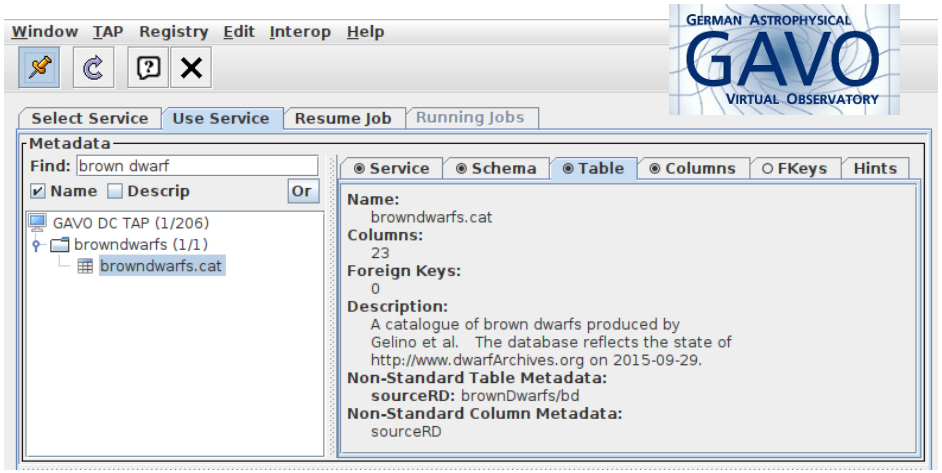
Metadata (author, pub. Year) available in text, but not using a standard

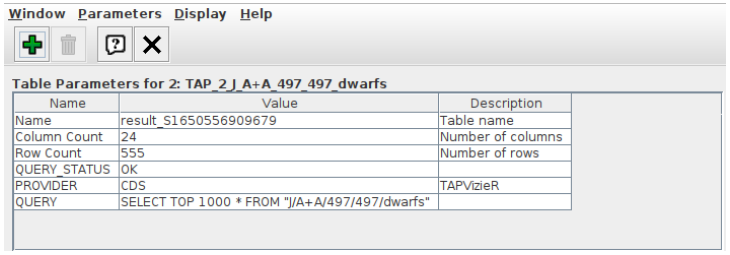
No Metadata concerning the filter used

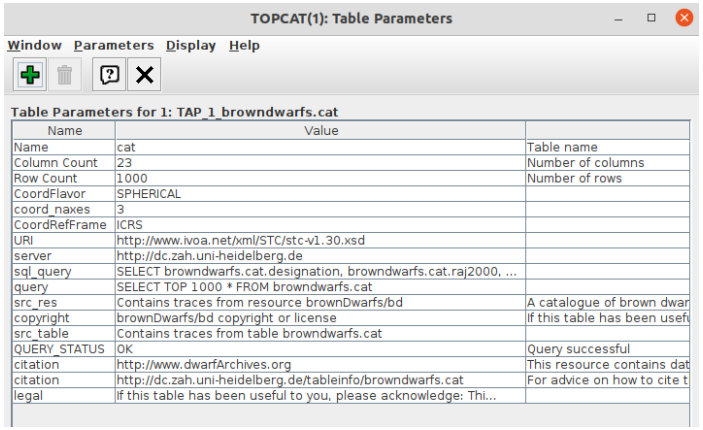
Origin in TAP

Brown dwarf query executed in TOPcat









- Origin (authors only) in the description
- VOTable header more verbose in GAVO:
  - Citation
  - Legal
  - Copyright

But no authors/ data orgin or references for the both !

Providing origin in rich output

Adding origin to metadata

Extract of metadata in VOTable using MiVOT or MangoDM

Filter definition linked to the columns

```
▼<INSTANCE ID="SDSS__g'" dmrole="mango:stcextend.PhotFilter" dmtype="mango:stcextend.PhotFilter">
    <ATTRIBUTE dmrole="mango:stcextend.PhotFilter.name" dmtype="ivoa:string" value="SDSS/g'"/>
    <ATTRIBUTE dmrole="mango:stcextend.PhotFilter.zeroPointFlux" dmtype="ivoa:real" value="3643.0"/>
    <ATTRIBUTE dmrole="mango:stcextend.PhotFilter.magnitudeSystem" dmtype="ivoa:string" value="NotSet"/>
    <ATTRIBUTE dmrole="mango:stcextend.PhotFilter.effectiveWavlength" dmtype="ivoa:real" value="0.482"/>
    <ATTRIBUTE dmrole="mango:stcextend.PhotFilter.unit" dmtype="ivoa:string" value="um"/>
    <ATTRIBUTE dmrole="mango:stcextend.PhotFilter.bandWidth" dmtype="ivoa:real" value="0.1245"/>
  </INSTANCE>
</GLOBALS>
```

Table Provenance (including filters assignment) provided though a URL

```
▼<INSTANCE dmrole="mango:Source.associatedDataDock" dmtype="ango:WebEndPpoint">
   <ATTRIBUTE dmrole="mango:AssociatedData.semantic" dmtype="ivoa:string" value="computed"/>
   <ATTRIBUTE dmrole="mango:AssociatedData.dataType" dmtype="ivoa:string" value="provDM"/>
   <ATTRIBUTE dmrole="mango:AssociatedData.description" dmtype="ivoa:string" value="Complete VizieR catalogue Provenance"/>
   <ATTRIBUTE dmrole="mango:WebEndPpoint.ContentType" dmtype="ivoa:string" value="text/xml"/>
   <ATTRIBUTE dmrole="mango:WebEndPpoint.url" dmtype="ivoa:url" value="https://cdsarc.unistra.fr/viz-bin/provenance?cat=J/A+A/472/699&filter=true"/>
 </INSTANCE>
```

Conclusion

- The registry provides a schema that can be used to the needs of origins
- Does it concern only VizieR?
- Make a list of interesting metadata ?
- Where to put Provenance ?
  - In data discovery
    - Registry
    - Protocols (TAP)
  - In query output
    - VOTable ? <info>
    - Vodml ? (Link to Provenance / landing page)