



European Science Cluster of Astronomy &
Particle physics ESFRI research Infrastructures

European
Data Provider Forum
and Training Event

23 November 2021

VO publication & EOSC publication

Marco Molinaro



ESCAPE - The European Science Cluster of Astronomy & Particle Physics ESFRI Research Infrastructures has received funding from the European Union's Horizon 2020 research and innovation programme under the Grant Agreement n° 824064.



- IVOA Euro-VO ESCAPE/CEVO EOSC
- Repositories & Metadata
- IVOA Registry
- EOSC Portal
- Current integration & ongoing work



VO resources architecture and EOSC integration

- IVOA (International Virtual Observatory Alliance)
 - focuses on the development of standards to facilitate the international development and deployment of the tools, systems and organizational structures necessary to enable the utilization of astronomical archives as an integrated and interoperating virtual observatory
- Euro-VO
 - brings together the European initiatives, community
 - funded through Euro-VO Tech, DCA, AIDA, ICE; CoSADIE; ASTERICS/DADI and now ESCAPE/CEVO
- ESCAPE/CEVO (Connecting ESFRI projects to EOSC through the VO)
 - architecture integration and assessment
 - VO standards updates through ESFRI requirements
 - stewardship and added value to astronomy archives
- EOSC (European Open Science Cloud)
 - develop a web of FAIR Data and services for science in Europe: a multi-disciplinary environment to publish, find and re-use data, tools and services
 - federated system of systems



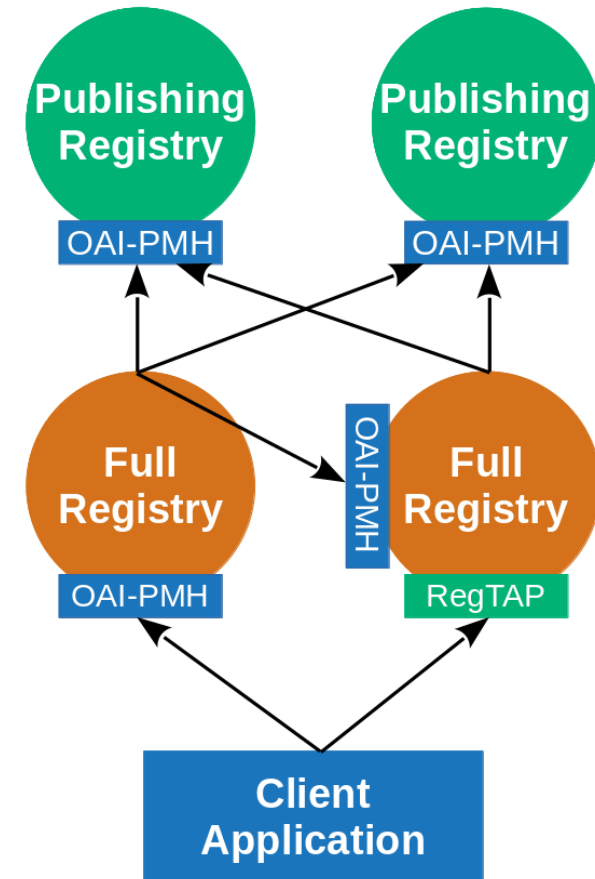
Repositories & Metadata

- Repositories
 - resource(s) metadata catalogues
 - general or domain specific
 - granularity
 - fit the [F4] FAIR guiding principle
 - (meta)data are registered or indexed in a searchable resource
 - Access, Interoperability and Re-usability may/should plug in here
 - more than simple resource listings
 - resource accessibility
 - struggle with the metadata model to encompass requirements
- Metadata Models
 - general purpose or domain fine grained
 - minimal metadata
 - mappings and cross walks



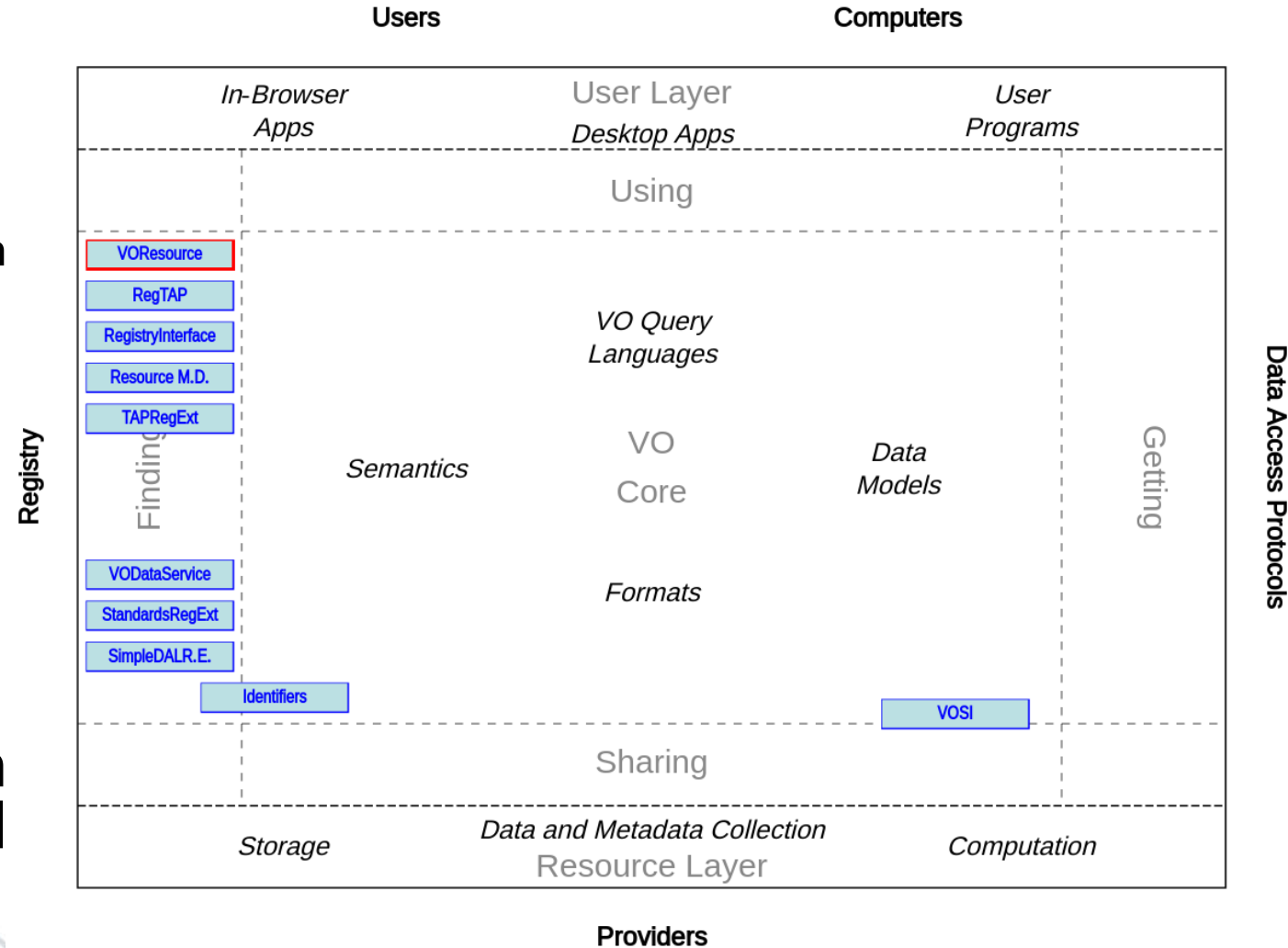
IVOA Registry: architecture

- Registry of Registries
 - a starting point to enter the (Full) Registries content
- Full Registries
 - (continuous) harvesting of resource records
 - from other Full/Publishing Registries
- OAI-PMH interface
 - to access full resource documents
 - for cross-domain interoperability
- RegTAP interface
 - for resource filtering
 - domain specific
 - task/activity specific



IVOA Registry: metadata model

- VOResource
 - global types then used in application specific schemas
- extension mechanism
 - Data Service
 - Simple Data Access
 - Table Access
 - ...
- global uniqueness based on authority resource identifier and management



- Record basic metadata blocks

- Identity
- Curation
- Content (general)
- quality flag

- Extensions

- vr:Service
 - Capability

- standardID(s)

- to link URL for standard interfaces

```
<capability standardID="ivo://ivoa.net/std/SIA#query-2.0">
  <!-- this describes a SIA version 2 "face" of the service -->
  <interface role="std" xsi:type="vs:ParamHTTP">
    <accessURL use="base">http://example.com/asvc/sia2.xml?</accessURL>
    <queryType>GET</queryType>
    <resultType>application/x-votable+xml</resultType>
    <param std="true">
      <name>POS</name>
      <description>Specification of a region of...</description>
      [... enumerate the parameters supported for SIAv2...]
    </param>
  </interface>

  <imageServiceType>Pointed</imageServiceType>
  <maxRecords>10000</maxRecords>
  <testQuery>
    <pos>
      <long>230.444</long>
      <lat>52.929</lat>
    </pos>
    <size>
      <long>0.1</long>
      <lat>0.1</lat>
    </size>
  </testQuery>
</capability>
```

```
<ri:Resource xsi:type="vr:Organisation"
  xmlns:vr="http://www.ivoa.net/xml/VOResource/v1.0"
  ...
  created="2009-02-15T12:00:00"
  updated="2009-02-15T12:00:00"
  status="active">
  <validationLevel validatedBy="ivo://archive.stsci.edu/nvregistry">2</validationLevel>

  <title>NCSA Radio Astronomy Imaging</title>
  <shortName>NCSA-RAI</shortName>
  <identifier>ivo://rai.ncsa/RAI</identifier>

  <curation>
    <publisher ivo-id="ivo://ncsa.uiuc/NCSA">
      National Center for Supercomputing Applications
    </publisher>
    <creator>
      <name>Crutcher, Richard </name>
      <logo>
        http://rai.ncsa.uiuc.edu/rai.jpg
      </logo>
    </creator>
    <date>1993-01-01</date>
    <contact>
      <name>Plante, R.</name>
      <email>rplante@ncsa.uiuc.edu</email>
    </contact>
  </curation>

  <content>
    <subject>radio astronomy</subject>
    <subject>data repositories</subject>
    <subject>digital libraries </subject>
    <subject>grid-based processing</subject>
    <description>
      The Radio Astronomy Imaging Group at the National Center for
      Supercomputing Applications is focused on applying
      high-performance computing to astronomical research. Our
      projects include the NCSA Astronomy Digital Image Library,
      the BIMA Data Archive, the BIMA Image Pipeline, and the
      National Virtual Observatory.
    </description>
    <referenceURL>http://rai.ncsa.uiuc.edu/</referenceURL>
    <type>Organisation</type>
    <contentLevel>Research</contentLevel>
  </content>

  <facility>Berkeley-Illinois-Maryland Array (BIMA)</facility>
  <facility>
    Combined Array for Research in Millimeter Astronomy (CARMA)
  </facility>
</ri:Resource>
```



- The current catalogue is the result of collaboration and merge of
 - eInfraCentral Service Catalogue
 - EOSC-Hub Marketplace
- This part of EOSC Portal serves as a universal entry point to the EOSC services, offering distributed and cloud computing resources enabling researchers and other users to process and analyse data in a distributed computing environment, access and order public and commercial e-infrastructure services supplied at national, regional and institutional levels
- From the supplier side, it offers local, national and international providers the opportunity to advertise their own services and resources, which is compliant with the needs of European research community

Welcome to the EOSC Portal Catalogue and Marketplace!

The current catalogue is the result of collaboration and merge of eInfraCentral Service Catalogue and EOSC-Hub Marketplace.

This part of EOSC Portal serves as a universal entry point to the EOSC services, offering distributed and cloud computing resources enabling researchers and other users to process and analyse data in a distributed computing environment; access and order public and commercial e-infrastructure services supplied at national, regional and institutional levels.

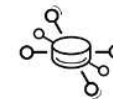
It helps to develop synergies and complementarity in data handling between research infrastructures, optimise technological implementation thus contributing to the development of a consistent European research infrastructures ecosystem and ensure integration and interoperability of data and tools within the EOSC.

From the supplier side, it offers local, national and international providers the opportunity to advertise their own services and resources, which is compliant with the needs of European research community.

Visit the [Catalogue & Marketplace](#) or choose from the categories below.



Access physical &
einfrastructures



Aggregators & Integrators



Process & Analysis



Security & Operations



Sharing & Discovery



Training & Support

Access EOSC regional and thematic projects

Five regional EOSC-related Horizon 2020 projects, supported within [INFRAEOSC-05-2018-2019](#), are collaborating on a wide range of topics, in order to enhance synergies in all mutual activities related to the EOSC. Specific areas for cooperation have been identified in order to develop a common strategy to synchronise activities within the wider EOSC ecosystem. Find out more about EOSC regional projects using the link below.

[EOSC REGIONAL PROJECTS](#)

The [European Strategy Forum on Research Infrastructures \(ESFRI\)](#) was established to shape collaboration in five thematic areas to pave the way for Open Access data for the EOSC. Through its cluster projects, supported by [INFRAEOSC-04-2018](#), ESFRI steers the integration and consolidation of thematic e-infrastructure platforms in preparation for connecting them to EOSC. The ESFRI cluster projects implement interfaces to integrate computer and data management solutions to create cross-border, interdisciplinary and open cooperation spaces for European researchers. Find out more about ESFRI thematic cluster projects using the link below.

[ESFRI THEMATIC CLUSTER PROJECTS](#)



- The current catalogue is the result of collaboration and merge of
 - eInfraCentral Service Catalogue
 - EOSC-Hub Marketplace
- This part of EOSC Portal serves as a universal entry point to the EOSC services, offering distributed and cloud computing resources enabling researchers and other users to process and analyse data in a distributed computing environment, access and order public and commercial e-infrastructure services supplied at national, regional and institutional levels
- From the supplier side, it offers local, international providers the opportunity to advertise their own services and resources, which is compliant with the needs of European research community

Welcome to the EOSC Portal Catalogue and Marketplace!

The current catalogue is the result of collaboration and merge of eInfraCentral Service Catalogue and EOSC-Hub Marketplace.

This part of EOSC Portal serves as a universal entry point to the EOSC services, offering distributed and cloud computing resources enabling researchers and other users to process and analyse data in a distributed computing environment; access and order public and commercial e-infrastructure services supplied at national, regional and institutional levels.

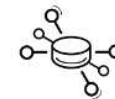
It helps to develop synergies and complementarity in data handling between research infrastructures, optimise technological implementation thus contributing to the development of a consistent European research infrastructures ecosystem and ensure integration and interoperability of data and tools within the EOSC.

From the supplier side, it offers local, national and international providers the opportunity to advertise their own services and resources, which is compliant with the needs of European research community.

Visit the Catalogue & Marketplace or choose from the categories below.



Access physical & einfrastructures



Aggregators & Integrators



Process & Analysis



Security & Operations



Sharing & Discovery



Training & Support

C regional and thematic projects

Horizon 2020 projects, supported within INFRAEOSC-05-2018-2019, are collaborating on a wide range to enhance synergies in all mutual activities related to the EOSC. Specific areas for cooperation have been developed to develop a common strategy to synchronise activities within the wider EOSC ecosystem. Find out more about projects using the link below.

EOSC REGIONAL PROJECTS

EOSC REGIONAL PROJECTS

ESFRI THEMATIC CLUSTER PROJECTS

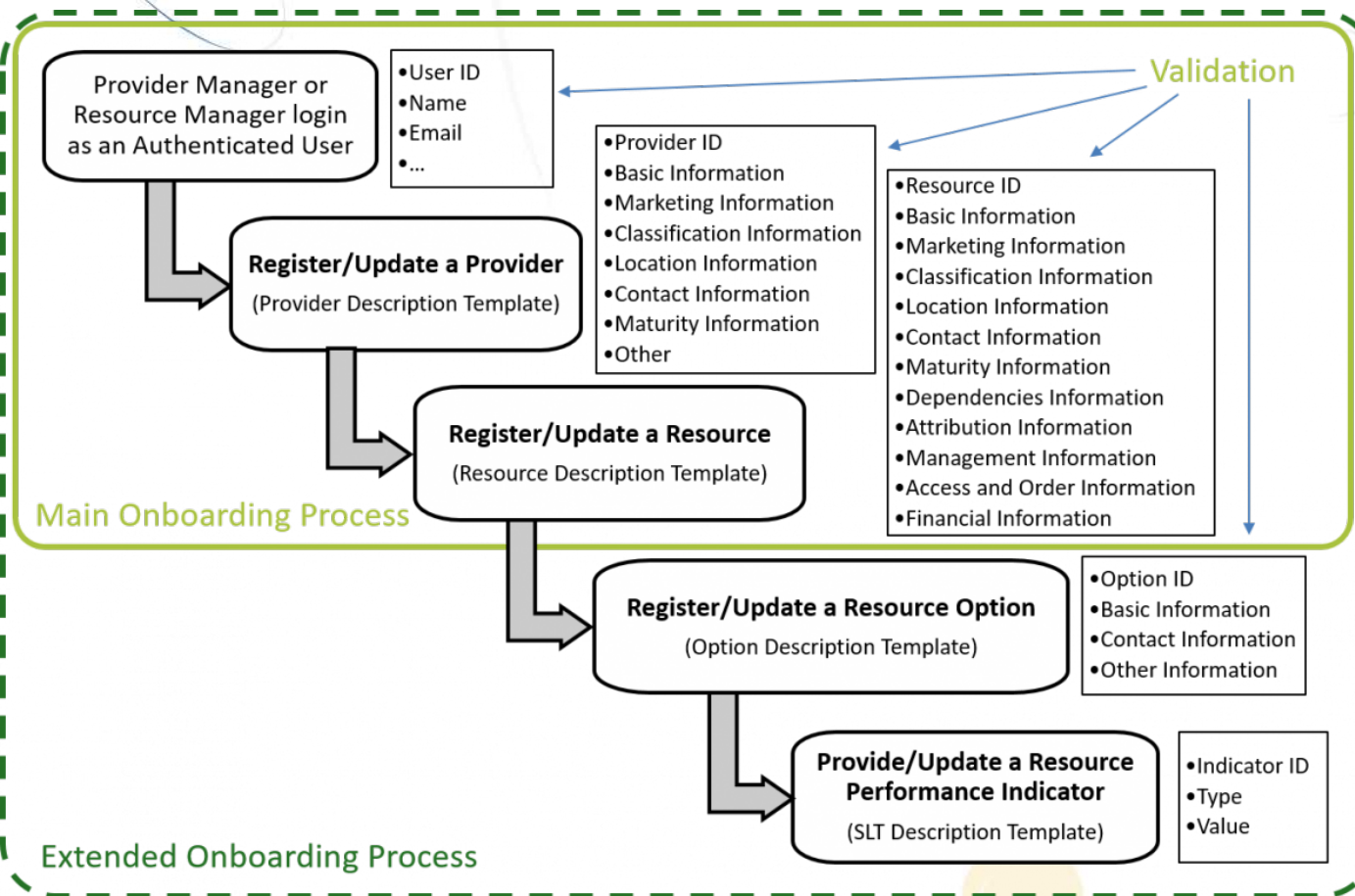
High Infrastructures (ESFRI) was established to shape collaboration in five thematic areas to the EOSC. Through its cluster projects, supported by INFRAEOSC-04-2018, ESFRI steers the e-infrastructure platforms in preparation for connecting them to EOSC. The ESFRI integrates computer and data management solutions to create cross-border, accessible services for European researchers. Find out more about ESFRI thematic cluster projects

ESFRI THEMATIC CLUSTER PROJECTS



- a Representative

- goes to the portal
- Registers
 - using an identity from a supported AAI
- logs in
- asserts s/he is authorised by the Provider
- applies for onboarding ...



Provider Profile Information Blocks

1. Basic *	4*
2. Marketing *	2*
3. Classification	
4. Location *	4*
5. Contact *	1*
6. Maturity	
7. Other	
8. Admins *	✓

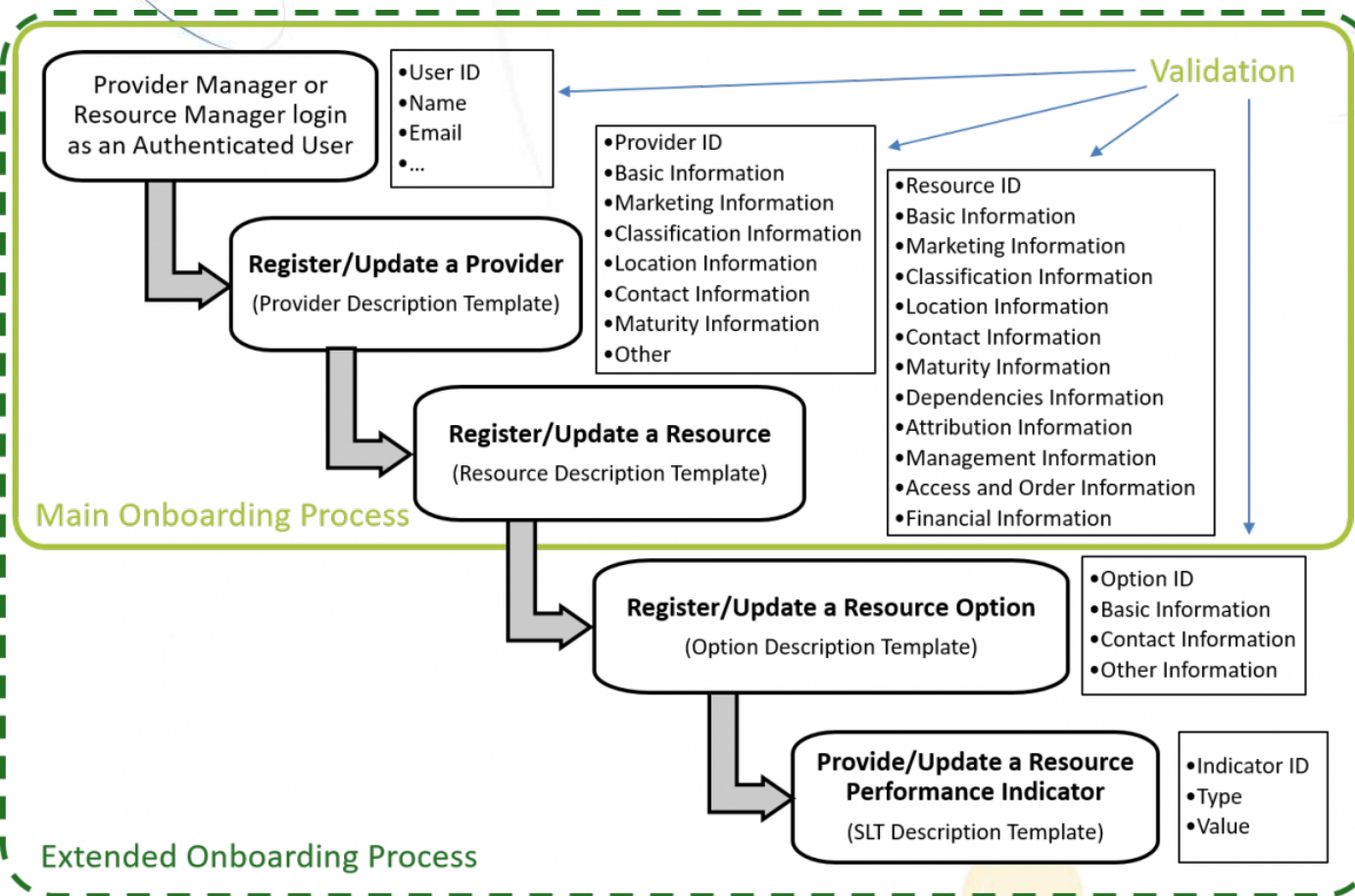
*Required fields

<https://eosc-portal.eu/sites/default/files/EOSC-Profiles-v3.00.pdf>



• the Representative

- waits for approval of the Provider
- applies for onboarding a Resource
 - web interface
 - programmatic API
 - JSON / HTTP POST



Resource Profile Information Blocks

1. Basic *	2*
2. Marketing *	3*
3. Classification *	3*
4. Availability *	2*
5. Location	
6. Contact *	3*
7. Maturity *	1*
8. Dependencies	
9. Attribution	
10. Management	
11. Order *	1*
12. Financial	

*Required fields

<https://eosc-portal.eu/sites/default/files/EOSC-Profiles-v3.00.pdf>



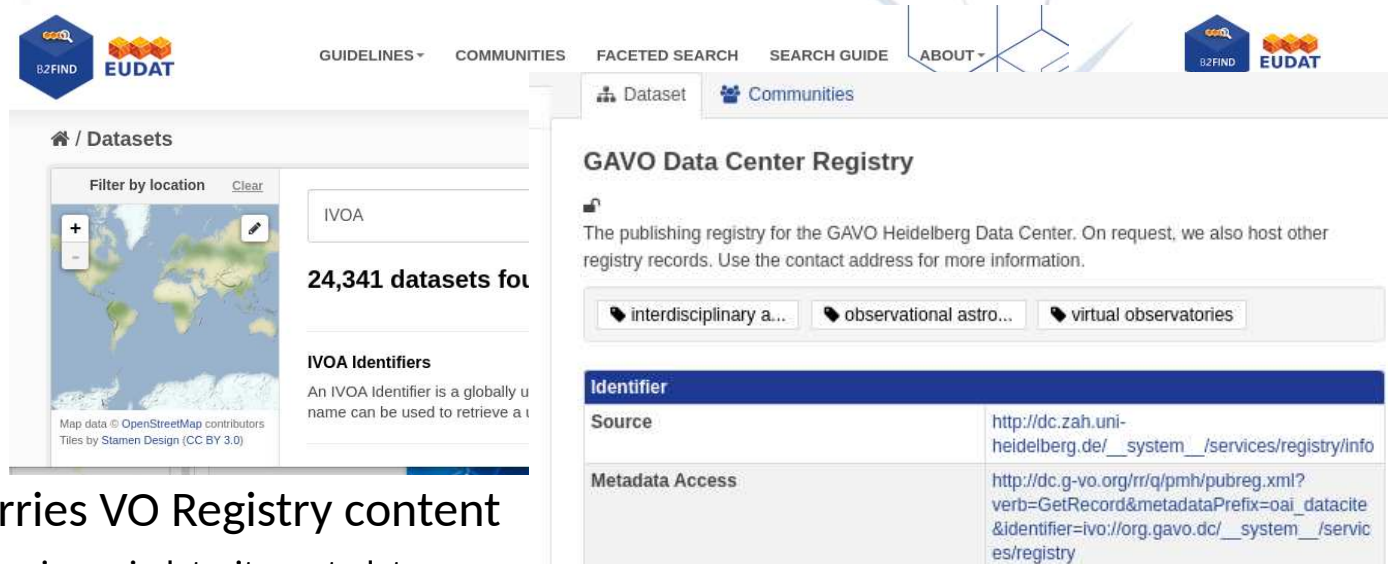
EOSC Portal: Profile Model

<https://eosc-portal.eu/sites/default/files/EOSC-Profiles-v3.00.pdf>

EOSC Provider + Add Resource



IVOA Registry integration in the EOSC landscape



EUDAT B2FIND

GUIDELINES COMMUNITIES FACETED SEARCH SEARCH GUIDE ABOUT

/ Datasets

Filter by location [Clear](#)

24,341 datasets for

IVOA Identifiers

An IVOA Identifier is a globally unique name that can be used to retrieve a dataset.

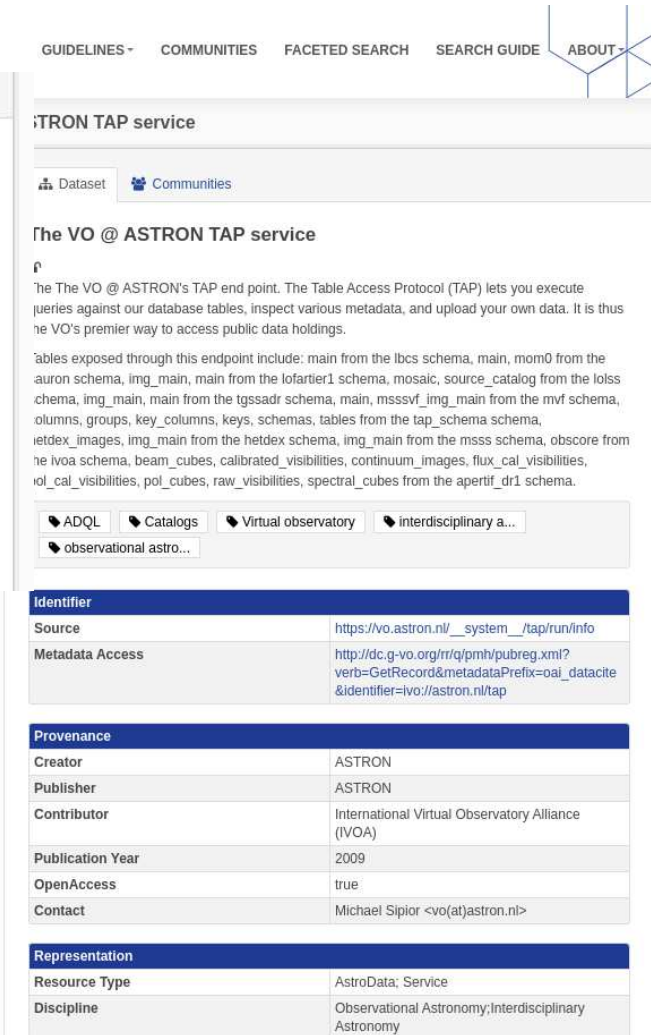
GAVO Data Center Registry

The publishing registry for the GAVO Heidelberg Data Center. On request, we also host other registry records. Use the contact address for more information.

[interdisciplinary a...](#) [observational astro...](#) [virtual observatories](#)

Identifier	
Source	http://dc.zah.uni-heidelberg.de/_system_/services/registry/info
Metadata Access	http://dc.g-vo.org/rr/q/pmh/pubreg.xml?verb=GetRecord&metadataPrefix=oai_datacite&identifier=ivo://org.gavo.dc/_system_/services/registry

- EUDAT B2FIND carries VO Registry content
 - harvesting OAI-PMH using oai_datacite metadata
 - working towards harvesting oai_b2find (adding, e.g., instruments) metadata
- Incomplete VOResource -> oai_datacite mapping
 - the most important metadatum in VO, the per-protocol access URLs, cannot be fully mapped into oai_datacite
 - also: no tablesets
 - mapping subjects to UAT top level concepts
- What should cross-disciplinary data discovery do?
 - sketches of user stories at:
 - <https://github.com/msdemlei/cross-discipline-discovery>
 - could be more of a “discover collaborators” than a “discover resources” problem



ASTRON TAP service

GUIDELINES COMMUNITIES FACETED SEARCH SEARCH GUIDE ABOUT

The VO @ ASTRON TAP service

The VO @ ASTRON's TAP end point. The Table Access Protocol (TAP) lets you execute queries against our database tables, inspect various metadata, and upload your own data. It is thus the VO's premier way to access public data holdings.

Tables exposed through this endpoint include: main from the lbc schema, main, mom0 from the auron schema, img_main, main from the lofartier1 schema, mosaic, source_catalog from the loiss schema, img_main, main from the tgssadr schema, main, msssvf_img_main from the mvf schema, columns, groups, key_columns, keys, schemas, tables from the tap_schema schema, ietdex_images, img_main from the hetdex schema, img_main from the mss schema, obscure from the ivoa schema, beam_cubes, calibrated_visibilities, continuum_images, flux_cal_visibilities, rol_cal_visibilities, pol_cubes, raw_visibilities, spectral_cubes from the aperitif_dr1 schema.

[ADQL](#) [Catalogs](#) [Virtual observatory](#) [interdisciplinary a...](#) [observational astro...](#)

Identifier	
Source	https://vo.astron.nl/_system_/tap/run/info
Metadata Access	http://dc.g-vo.org/rr/q/pmh/pubreg.xml?verb=GetRecord&metadataPrefix=oai_datacite&identifier=ivo://astron.nl/tap

Provenance	
Creator	ASTRON
Publisher	ASTRON
Contributor	International Virtual Observatory Alliance (IVOA)
Publication Year	2009
OpenAccess	true
Contact	Michael Sipior <vo(at)astron.nl>

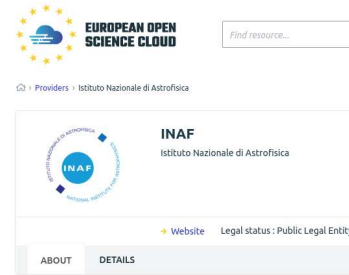
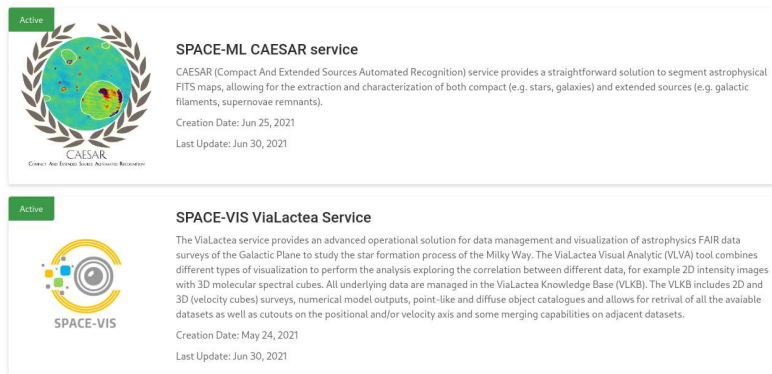
Representation	
Resource Type	AstroData; Service
Discipline	Observational Astronomy; Interdisciplinary Astronomy



VO Resources direct onboarding in the EOSC portal

• Onboarding

- assesment & contribution guidelines
- ✓ setup a Provider within EOSC
- ✓ test the onboarding procedure
 - using non VO Registered resources
- ✗ test the onboarding procedure
 - starting from VO Registered resources
- ✗ report guidelines
 - to minimise duplicated efforts



differences

IVOA

- authority
- Model
 - Flexible, complex, extensible
- distribute & harvest
- emphasis on declaring APIs available per data collection
- metadata granularity
- matured over time
- community “weather reports”

EOSC

- provider, AARP
- Model
 - single resource, general domain
- form based
 - programmatic API available
- external repositories inclusion:
 - domain, national, cluster (?)
- emphasis on policies



Thank you for your attention!

