

The astronomical Virtual Observatory and EOSC

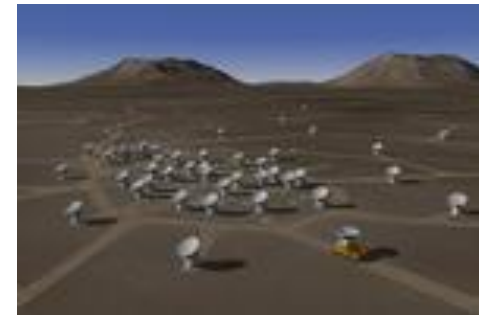
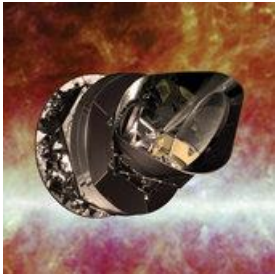
Francoise Genova

ASTERICS DADI, CNRS/CDS



Research Data Sharing
without barriers

Research infrastructures in astronomy



And data!

The astronomical data infrastructure

- Includes
 - Observatory archives
 - Very large surveys
 - Value-added databases
 - Journals and the ADS bibliographic database
 - Long tail of data (results attached to publications)
 - Modeling results
- Remotely accessible services before the web
- Networked on-line services through web links

Early standards

- A long tradition of international collaboration to build telescopes and instruments
- Early work on standards by practitioners
 - Data format FITS (1977)
 - Integrates data & metadata
 - Enables sharing telescopic observations
 - Enables tool development
 - Bibcode (late 80's)
 - Identifies a bibliographic reference
 - Human readable
 - Long before DOIs!
 - Links between databases and journals

The astronomical Virtual Observatory

- The astronomical interoperability framework
- Developed and maintained by the International Virtual Observatory Alliance
 - Created in 2002
 - Gathers national initiatives + Euro-VO + ESA
 - All continents represented
- IVOA oversees the development of interoperability standards
 - Thin interoperability layer on top of data holdings



IVOA members



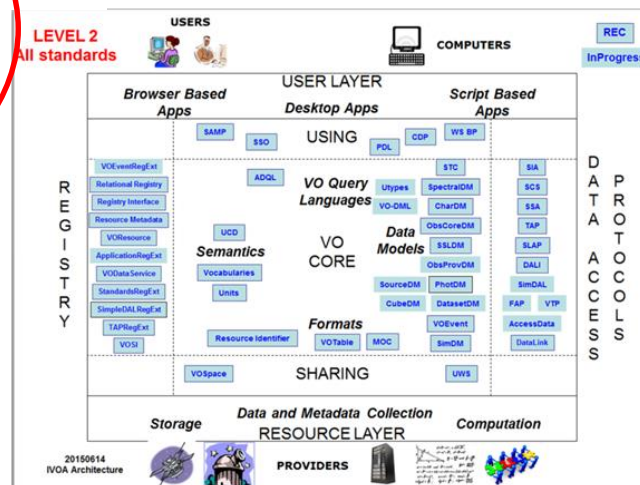
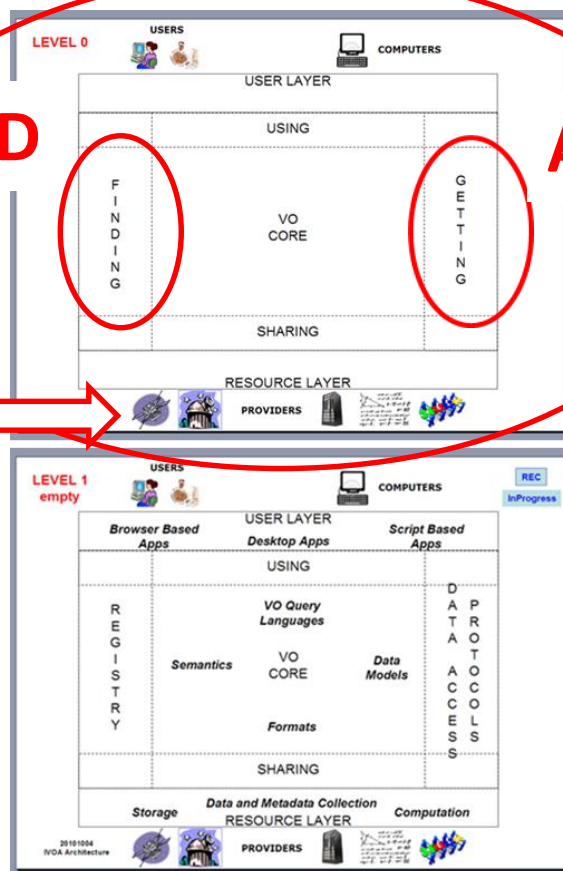
The VO architecture

INTEROPERATE

FIND

ACCESS

**REUSABLE
DATA**



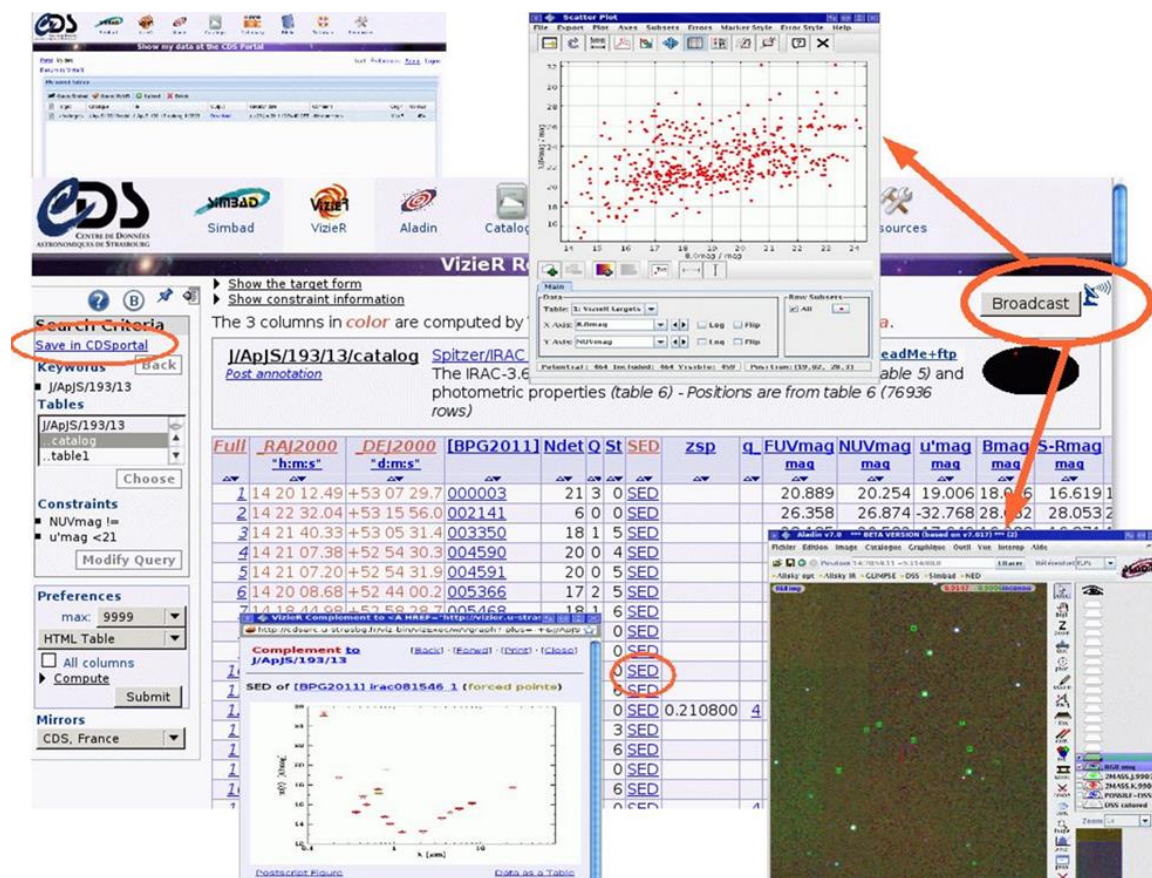
Astronomical data is open and FAIR

- Data providers
 - Reusable data (FITS)
 - In general short embargo period for observations
- VO developers
 - Framework to find, access, interoperate data
 - Interoperable tools (Applications WG)

The astronomical Virtual Research Environment

- Open and inclusive
 - Anyone can register a resource
 - Anyone can develop an interoperable tool
- More than 100 authorities declared at least a resource in the IVOA Registry of Resources
 - Big players and smaller teams
- Operational and used
 - HST: More papers from archival research than observers
 - CDS: more than 800,000 queries/day

Interoperable VO tools



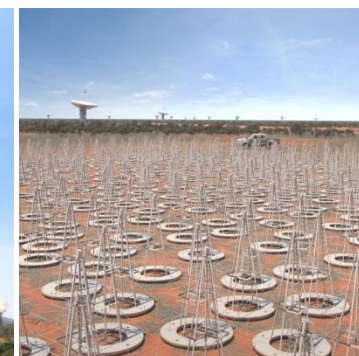
ASTERICS WP4 DADI

- Data Access, Discovery and interoperability
- Make the ESFRI and pathfinder project data available for discovery and usage by the whole astronomical community, interoperable in the VO, and accessible with a set of common tools.
- Fully aligned with the current IVOA priorities

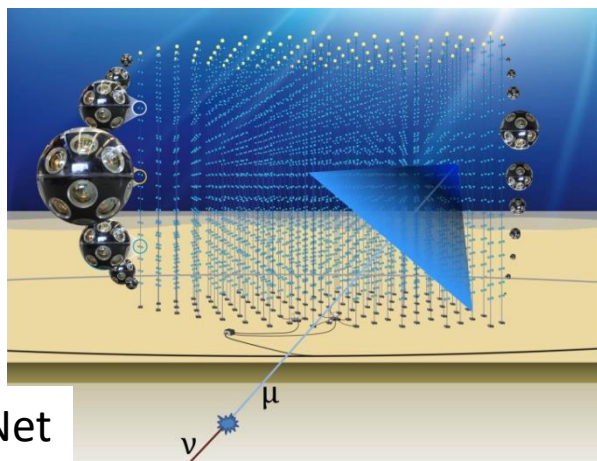
ESO Associate Partner; close collaboration with ESA



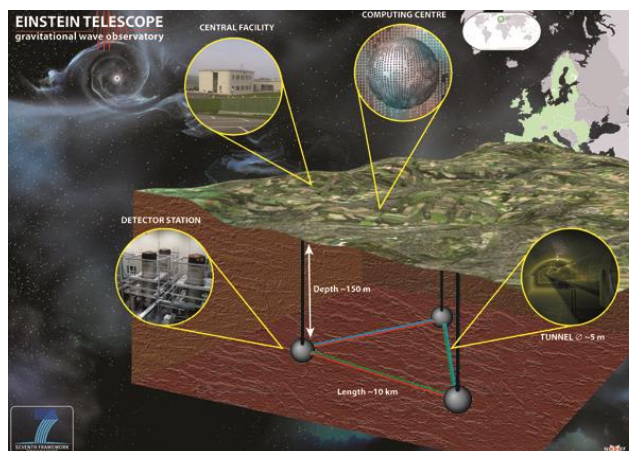
CTA



SKA

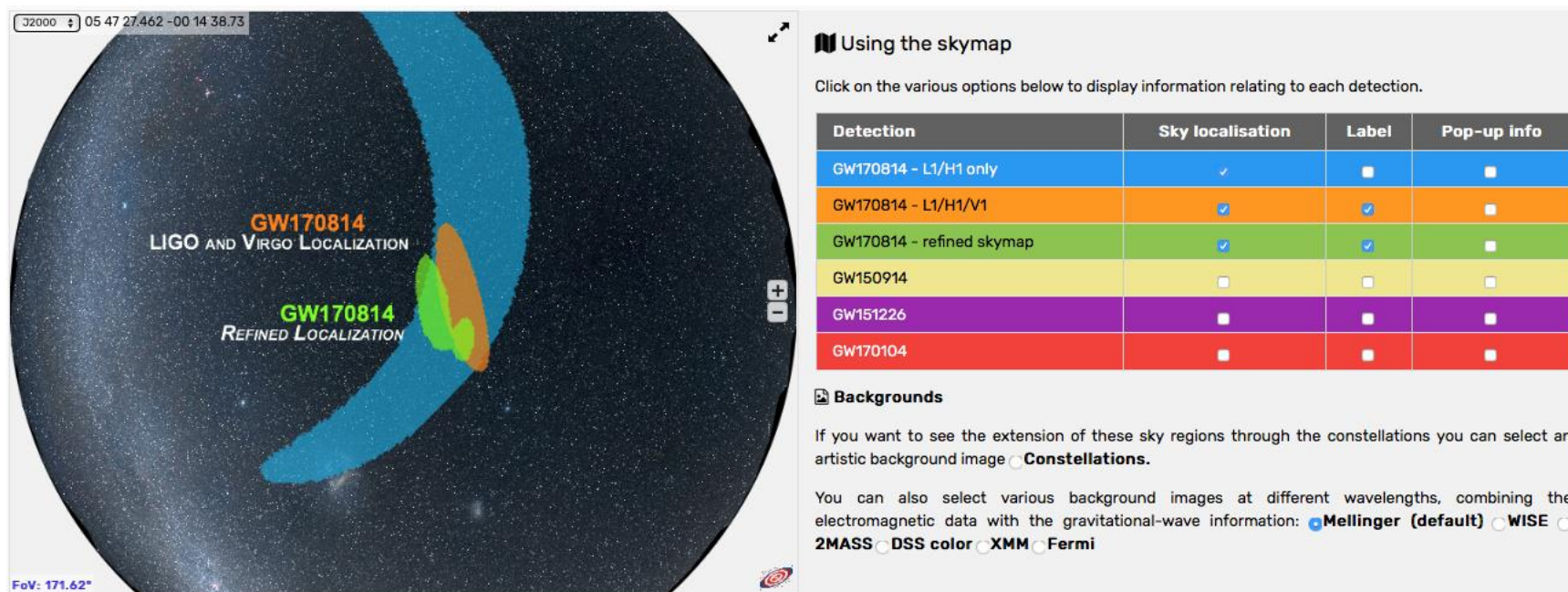


KM3Net



EGO/ET

An example of the results



The VO is reused

- Starting point: thin interoperability layer for astronomy
- Building blocks reused by data providers in the archival systems
- ASTERICS: Astrophysics/Astroparticle physics
- Standards and tools customized by planetary studies & the Virtual Atomic and Molecular Data Centre
- Registry customized by Material Sciences in a RDA Working Group

Relationship with EOSC: services

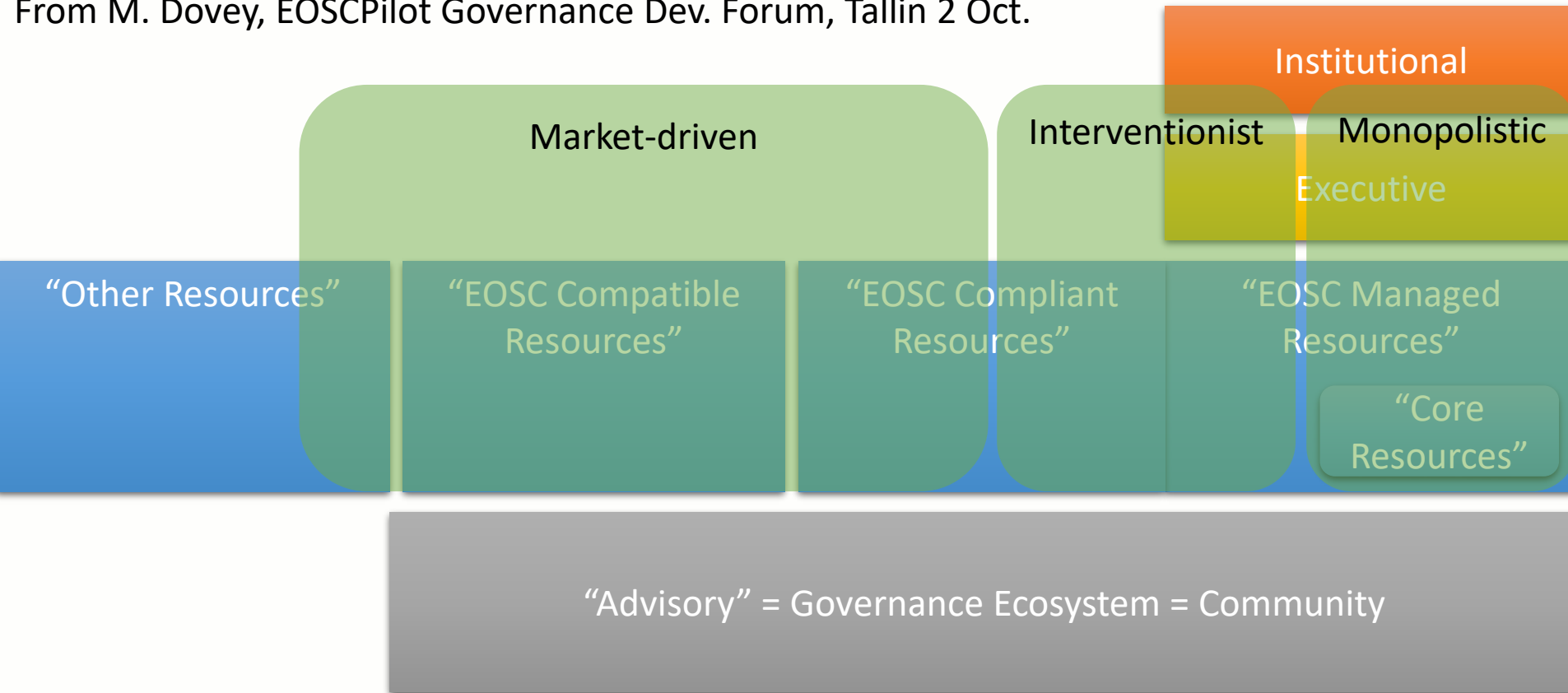
- Seen from the scientific community community
 - « Services » are not only IT services!
 - Researchers will expect to find the data services they use everyday in the EOSC in the one-stop-shop vision
- Seen by France
 - ESFRIs and national Roadmap as starting points to build the EOSC
 - CDS is in the national Research Infrastructure Roadmap
- ‘Gems’ to be taken into account in governance, rules of engagement and Service Portfolio



EOSC Model - Overview

Member States

From M. Dovey, EOSCPilot Governance Dev. Forum, Tallin 2 Oct.



Relationship with EOSC: services

- Exercise discussed with Jan Bot to include CDS services in the Portfolio
- Light overhead to include a service
 - Lessons learnt from the IVOA philosophy of light interoperability layer – one of the keys for success
 - Some observatory archives require their users to register, but many services are open
 - Should not impose registration

EOSC and IVOA

- IVOA is a EUDAT B2FIND Community
- The IVOA Registry of Resources is already included in EUDAT B2FIND
 - Both are OAI-PMH
 - IVOA RoR includes the whole Dublin core plus disciplinary extensions
- Huge work on Semantics in IVOA

Fichier Édition Affichage Historique Marque-pages Outils ?

Communities - B2FIND x +

b2find.eudat.eu/group?q=&sort=name+desc 67% eudat B2FIND

GO TO EUDAT WEBSITE

B2FIND **EUDAT**

GUIDELINES - HELP - COMMUNITIES FACETED SEARCH CONTACT -

/ Communities

Communities

EUDAT represents a unique partnership between research communities and data centers.
It brings together data service providers and users who are directly involved with the design of data services.

Search communities...

19 communities found Order by: Name Descending

 The European Library The European Library comprises digital resources supplied by a prestigious... 3733 Datasets	 SEANOE SEANOE (SEA sciENtific Open data Edition) is a publisher of scientific data... 248 Datasets	 SDL Search Digital Libraries (SDL) is hosted by the Documentation Research and... 23930 Datasets
 PDC The PDC is a database of metadata and data that describes, indexes, and... 2468 Datasets	 PaNdata PaNdata - the Photon and Neutron data infrastructure initiative - brings... 1701 Datasets	 NARCIS NARCIS provides access to scientific information, including (open access)... 146161 Datasets
 IVOA The International Virtual Observatory Alliance (IVOA) was formed in June 2002... 17816 Datasets	 IST The Institute of Science and Technology Austria (IST) is a young... 21 Datasets	 GFZ The German Research Centre for Geosciences (GFZ) is the national research... 6236 Datasets
 EARLINET EARLINET, the European Aerosol Research Lidar Network, (www.earlinet.org) is... 997 Datasets	 ENES The European Network for Earth System modelling (ENES) provides information... 997 Datasets	 GBIF The Global Biodiversity Information Facility (GBIF) was established by... 34019 Datasets

Computation

- Astronomers use local, regional, national and European facilities for computing
- « Bring computing near data »
- Interoperability between data and computing infrastructures
- Must be transparent to end users

Key requirements

- The astronomy on-line services and the VO are used by the community in their daily work and should be « in » the EOSC
- Users are both the science community and the data providers
- Any loss of the capacity to fulfil the users' needs would be an issue
- Light overhead to join
- Possibility to interoperate with EOSC components