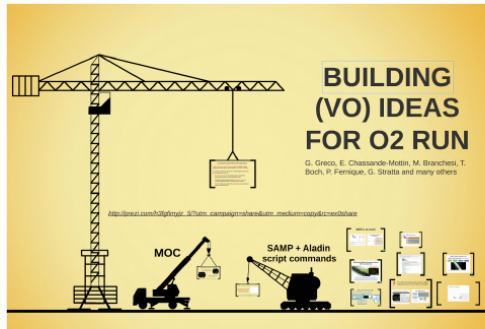


Conclusions for discussion

- The high level of diversity of European data providers was well represented
- Large, medium, smaller organisations
 - Intergovernmental organisations (ESA, ESO)
 - ESFRI and other large projects
 - Centres playing a national role and/or aggregating data sets from different projects
 - Observatories
 - Disciplinary or specific projects
 - Current and future projects, legacy (plate collections)

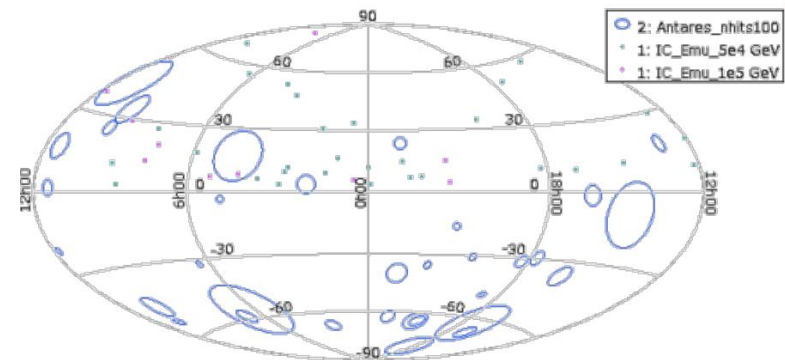
GW alerts and skymaps (2)



Credits: Giuseppe Greco (INFN)

- Help to define follow-up strategy
 - Visualize, tile and combine skymaps with other information (e.g., galaxy catalog for "mass targeting")
 - On-going collaboration to demonstrate usage of VO tools (Multi Order Coverage Map)
 - Skymaps will soon include a distance estimate for binary mergers

TopCAT usage examples



Correlation between high energy IC40 events (Emu > 100 TeV) and Antares high energy events (nhits > 100)

- Astronomy/astroparticles, i.e., multi-wavelength/multi-messengers (ASTERICS remit) + nearby disciplines – solar and planetary studies, atomic and molecular physics
- Several disciplines customize the VO standards and tools (e.g., EPN-TAP, VAMDC)
- EST is a new ESFRI
 - A relationship to build
 - Share the knowledge accumulated in building the VO
- Also very diverse subjects proposed by the participants, VO usage and many other topics
- Quality is an important keyword – raw/processed & steps below processed. Case by case decision depending of the needs. Keep track of calibration and processes. Instrument knowledge. Go back for the Nobel price.
- Quality of processes – cannot guarantee individual quality

- First successful event in 2013 (CoSADIE)
- At that time one of the main points was that participants were using the VO, why and how
- This time
 - The VO is in the landscape
 - Awareness of the general landscape (RDA, certification, DOIs)
- Liaison with RDA one of DADI subtasks

- VO: a framework of standards and tools
- Standards
 - They are used to ensure interoperability but also as building blocks of the data provider system
 - Many were cited (incl. VOSpace for distributed storage, TAP can play a central role, ADQL, PDL, etc)
- Tools
 - Tools in support to data publication: Training tomorrow (DaCHS, SAADA, TAPHandle, ...)
 - Tools in support to data usage: TOPCAT, Aladin, SplatVO, ...

Topics of interest (1)

- The two current IVOA priorities:
 - Time domain – use cases for evolution
 - Multi-D data (3D/IFU, radio, multi-epoch photometry...)
 - « convergence to few stable protocols for data access »
- VO domain expansion, e.g. ObsCore evolution - Mandatory/optional
- Authorisation & Authentication (non-public data, proprietary period, usage statistics, ...) – include it properly in the VO ecosystem with fine grain access. IVOA:SSO RFC (OpenID) standards/who runs authenticators (EUDAT or else)
- Provenance – call for additional use cases

Topics of interest (2)

- Pgsphere few explicit marks of interest but high level of usage – high impact
- ADQL – use cases please
- DOIs – very important even if the devil is in the details
- PDL/UWS
- NoSQL (Query Language), Docker, Hadoop/Spark (G&WS)
- Formats: FITS (incl. CTA et al.), HDF5 (proposal to bring it closer to FITS), MBFITS, OIFITS - VO aspects?
- Simulations – VO standards are being completed


Other elements of ESO wish list

- VO accessibility of textual release descriptions
 - Data Link also for a link to services 👍
- Object categories (SIMBAD...)
- FITS serialisation of new data models – “keyword” from data models
- Dynamic visualisation of spectra/cubes in a web page – size? HiPS cubes easy but
- Incremental creation of HiPS 👍

Tools

- Groups develop tools, some of them are shared
- Documentation? Dissemination? Sustainability?
- How to avoid to reinvent the wheel?
- Tutorials tomorrow
- List of libraries and tools – IVOA page but maintenance
- Deliverable: « Repository » of DADI « products »
(?) Lists & links to sustainable and maintained sources

The meeting itself

- Many talks proposed on many different topics:
Forum 
- Presentation of VO: Gregory's talk + registry + Obscore – customization example: EPN-TAP/Core
- Training tomorrow + registry yesterday
- Not enough time for discussion
- Specific focused meetings? Subjects?
- Next meeting in two years, suggestions?

Suggestions

- Focus presentations better
- VO discussion?
- Newcomer session ?
- Basic overview in a pdf – where the topics are in the big picture
- Put things on the wiki page?
- Movies of people using the VO
- Contacts for the different topics, kinds of data, ...
- Link slides to the programs
- List of experts