----------Dec 16th M.Louys----------
I have reorganised the notes/
please complete the participants list /
I have inserted the notes from the chat into the various topics bullets.

I have sketched a table to poll the group about priorities and calendar availability

hope this helps /
Mireille

Participants :
François Bonnarel (FB) , Mathias Fuessling (MF), Karl Kosack (KK), Catherine Boisson (CB), Bruno Khelifi (BK)
Mathieu Servillat (MS), Jutta Schnabel (JS), Kay Graff (KG), Mireille Louys (ML), Laurent Michel (LM) (IVOA DM chair, Obs. de Strasbourg)
PS ?

Time Presentation 's Title - Speakers
2PM) Goals of the meeting : FB < 3 minutes
Explore VO DataModels to make HE data FAIR

- Explore use-cases
- investigate possibel updated

2:03 PM) CTA data model / current CTA work about DL3 and higher level modelisation. question of metadata (10' + 5 discussion : Matthias Fuessling and Karl Kosack) current modelisation
Karl KOSACK CTA DM

CTA large FoV 8deg
mutiple telescopes - many subarrays - photon counting - no pointing - long integration time
CLev1 == image of sky with
lev 3 science ready ev lists >> science image quiclooks are Lev 5
>> Calib levels match with ObsCore? likely not
DM: work in progress
DM cover both data and data provenance
DL3 model to be used for interoperality (toward IVOA DM)
DL5 data model to be mapped to IVOA
Lower level models rather to be used internally to the CTA project

NB: possible use of IVOA standards identified: ObsCore, MOC, HiPS
to represent the spatial coverage of a data product , which can gather multiple sources
Questions :
ML : what is the particularity of likelihood data. Interested to know more

- --> KK : it's basically an extra dimension to a spectrum, light-curve, or flux map that gives the likelihood
- distribution for each bin (useful for combining multi-xavelenght data later)

Mireille: Likelihood : which dimension , nature is this measurement?
dimensionless: something like the probability for a pattern to be true

LM : is the DM aimed to describe the data provenance or the data itself ?
- MF : both :-)

2:18 PM) KM3net data modelling and VO activities : (10' + 5 discussion Jutta Schnabel et al.) / report on first implementations. Modelisation of simulation data

Jutta Schnaebel Neutrinos
Single event data, no spectrum -->
Already VO compliant with Dachs implementation for TAP services
+ Voevents
VO service Registered as KM3NET
All Other data in KM3Net Open data center (non VO)
questions: how to integrate simulation sets into the VO
How to provide access to IRF ?
?? can TAP service be used for this?
science case for that : Models of Galactic Source Emissions with CTA and KM3NeT (master thesis)

2:33 PM) Open gamma ray initiative and "Gamma-ray Astro Data Format" : (10' + 5' discussion Bruno Khelifi) work done so far by this consortium and possibility of convergence with VO

Bruno KHELIFI Gamma astro format
Gamma AstroData Format (GADF) built by an "open initiative" rathger informal
Used for pointing IACT instruments (HESS, VERITAS, MAGIC , > 10 Gev ....-> CTA)
Goal is interoperability + other FAIR principles
Format DL3 -> DL6
Support (or close to) FAIR principles
Prov and metadata description to be improved

VO: Must get closer to ongoing DM WG work
DL3 candidates : Obscore, and characterisation (including IRF...)
DL4 candidates : Characterisation ---> also Cube data model (LM)
DL5 (SED, Light curves, etc..;) ---> Spectrum data model , TimeSeries annotation note, charac
DL6 (catalogues) ---> UCD+
All VO specs seems to be incomplete
SpectrumDM / need to have a look at Cube data model, as suggested by Laurent Michel
extend to gama ray non pointing instrument and neutrino telescopes ---> VHE open data format
Need to run a meeting with IVOA DM WG including CTA

2:48 PM) CTA consortium + VO experts (CDS, ESA, DM WG) previous activities report : (10' + 5' Mireille LouysL and Mathieu Servillat)

Mireille Louys Metadata for HE data description

Previous work study on articulating VO models with HE data
Various packages identified :
  Target, curation, access, characterization ---> towards ObsCore
  Processing ---> Provenance
  ObservationConfiguration : specific and partially provenance
Looking what is covered by Obscore and what is not
Work in progress including work on Provenance
Need to expand Obscore (once more)
Need to link interpretation data (maps , irf)

Mathieu
Document on the VO data access in CTA
CTA master access data model
Obscore description adapted to CTA
OvsTAP protype service + WEB interface
OPUS interface to processingt and provenance
Working demo

3:10 PM) IVOA standards potentially useful for CTA / KM3net : current status (10' + 5 ' discussion François Bonnarel)
FB Standards usable
Usable Protocols and models: SCS/TAP/HiPS/MANGO? for DL6 catalogs
ObsCore/DataLink/CubeDM/SSA/hIPS for DL5 images,spectra,timeseries
Obscore+extension/DataLink/CUbeDM/Mango for DL3
/Mapping from binned events to science data

3:25 -4 PM) discussion.
The Goal is to figure out what are the next steps for 2022, to build up a concrete work plan for each partner.
A slide from each contributor on the next goals from their perspective will be highly appreciated.

#Possible Topics for future workshops

1- Access/description to IRF
Central topic OGIP vs VO I suppose

2- Mapping CTA data Model and DL3 or Gamma-ray open format to IVOA models
CB: should also consider mapping on DL5 : ex : Spectrum model comes mainly from Optical regime
and needs to be adapted in the case of HE data

3- Access/description of high level products (DL5/DL6)

Comes later after mapping

4-Open gamma ray initiative / IVOA data model connection

- LM : we have to discuss about ongoing VODM efforts
- Upper limit coming soon in Spectral DM1.1for instance
-
- MS : the obscore table is built from obs-data and data from hdu-table
-
- LM: a similarity of practice in X-RAY data :
- Binned data access are also important for X-ray
- BK : DL4 are binned data on the sky frame ... the DL3 IRFs are stored in some in instrument coordinate systems .
- So a conversion is needed to make the scientific analysis.
- For catalogues, FERMI-LAT manages to publish their catalog.
- So I think that UCD1+ standards should be OK for us
- BK: X-ray is using the OGIP format.
- I do not know if it follows IVOA standards. (I think that no, as it is and 'old' format)
- PS: GammaPy is able to read the OGIP format, in parallel to the GADF format
- LM : I can say that IVOA doesn not follow OGIP

- LM : But not hopeless! The purpose is not the same and some overlap can be found
- BK : the tricky point is the X-ray IRFs...
- LM : Is there a need to model such dataset ? We may just need to describe their scope ?
- LM : lots of topics to discuss in this field
- Cannot totally separate data model from access to data products and interpretation-oriented data (maps)

5-Science case starting from user query
- includes neutrino / gamma-connection and IRFs

6-Observatory metadata
- what is needed to find/discover and access the data?
- where does metadata in CTA fit in IVOA

#Discussion:

KM3net : Jutta
need to check what to expose in terms of IRF:
- First level use case: Provide IRF alongside a specific neutrino data set in the VO
linking diff products together:
- Second level implementation: Link a service when selecting subsets from a data set to provide analysis-specific IRFs
(might be different discovery metadata?)

MF: agrees we need a meeting on IRF (instrument's response function)
can it be commonly modeled for several projetcs : CTA / KM3net
where is it described in the VO ? where can it fit ?

Question: if you combine observations , can you serve the combined IRF computed ?

KK: data models / data access
Mapping may be more important than IRF interoperability which is more technical detail
BK, CB, ML +1, +1,+1

Where does metadata in CTA fit in IVOA:
some work started already / to be continued
check with Mathieu 's presentation and Bruno's presentation :

LM: Next IVOA meeting to plan a specialized session on HEP data. Worth to follow and contribute?

BK: can we use a N-D maps to represent IRF ?
can the Cube DM tackle this ?
KK: one caveat : IRF cubes have non uniform axes (so could be an issue) and may be stored sparsely.
--> ML: IVOA Cube supports sparse data

KK: I think mapping is maybe more important than IRFs (IRF interoperability is more of a technical detail)
BK : indeed, if we can already do the mapping for the event lists (DL3), we will learn a lot and then the work on IRFs will be easier
a technical f2f workshop would be ideal
KK: one caveat : IRF cubes have non-uniform axes (so could be an issue), and may even be stored sparsely.
LM : We really need to check such dataset against CubeDM
CB : @Laurent, @Karl yes CubeDM need to be checked

BK : Ideally, one needs N-dimensional map object, with random axis, ie on its content (units) and on its 'grid' (lin, log, completly non-uniform)
LM : Is that stuff described on OGIP?
CB : yes as rmf, arf but badly
LM : I know, but those I'm using are quite simpler

BK: how can we consider HiPS format for data
FB: can be considered in the Access topic

Draft proposal:TBC

Homework Proposed :

would you mind ranking your priorities for the topics you want to tackle in the first 2022 semester.

That would help to phase the work and converge together in successive Escape hackaton meetings (for instance)

Each group could make progress and collaborate in the mean time

please fill in the doc here :

https://docs.google.com/document/d/15nE8VWb7AGJ6N4bLbN__zBy7H--ZpGtGr7AvsJFQ7ys/edit?usp=sharing