CTA/KM3Net VO DataModels progress

Use / science cases

I) Starting Point
Generic Use case : data discovery
- discover observations and related data according to some physical criteria.

- Discover access methods. This requires standardized description of metadata in the VO framework.
Interoperabilty between Gama/neutrIno data and other wavelengths data

"Using data" standardisation (with specific tools ? in platforms ?) will come after

This generic data use case is Useful in following science cases:

a) For a given source find out time data. Find out Observations at all wavelengths as a function of time

b) Start from targeted data : look at the whole content of an observation apart from the target . Target may be not centered. Find out background value

c) Spectral energy distribution (SED) creation : covered field size is a critical parameter. this quantity must be accessible with the data_product.

II) discussion of use cases during the hack a thon

a) What are the ways people want to access data ?
We need to document that .
Is that done for Hess/neutrino data ?
We can look at the ObsCore appendix. It's a good example of what has to be done.
We have to involve scientists to describe high level science cases
There is no conceptual work on general data discovery in KM3NeT yet.
Here we are discussing on DL3 data. DL5/6 will come later.
All this belox is on the "list" : there is no document ?
→ we should write it

b) Importance of time queries
for time it may be difficult to discover if there are data (discussion Ada/catherine)
fine description of time axis beyond time bounds and resolution ? -> extensio,
also related to scheduling
Hess doesn't give its schedule.
Nothing like this in ObsCore
But ObsLocTAP does that (and ObsVisSap)

c) query by reference position
sometimes (in dl3 for exemple) you get only the pointing
and at dl5 you can get the poisition of the source
Pointing position is close to target position
Querying by target is also important

d) neutrino
We should remove the mandatory status of fixed coordinates for neutrinos???
We point in altazimuth directions. ICRS position is constantly changing
pointings should be recorded
KM3Net has a ConeSearch.
Do we have datasets or neutrinos in this service ?
In KM3Net ConeSearch we have only neutrinos

at some point where we get gamma signal
is there some neutrino detection ?
or is there no detection over a lower limit or whatever ? → also very important

find a data set which has coverage half sky
where there could be a neutrino
observation was done many hours in this region and you did not get a neutrino
this is also a matter of sensitivity

This is important to know if there is no signal. Discussed with Ada from CSP for a future High energy IVOA meeting

e) other material to discover

Response functions related to the observations

Thereare several steps in discovery
1) was there an observation for one time period and one direction
2) then are there probability maps , significance maps, upper limit maps to be compared

f) All this related to CTA datamodel for metadata
Karl to complete the CTA dm to describe the observation process

g) are the data private or public ?
there are proprietary periods

We need to check that they are not are embargoed
If metadata are public

h) once you have discovered a data set you need to know if you want to access this :
what is the format , type , calib level , etc .
–>Open gamma ray format

Mapping table

ObsCore Mandatory attributes	Obs-index, hdu-index keyword or other metadata	CTA datamodel concept	Discussion
s_ra	ra_pnt + observation mode (pointed or not pointed or...)		
s_dec	dec_pnt+ observation mode (pointed or not pointed or...)		

s_resolution	dependent of energy and exptime and position -> null		could be the precision (?) of reconstruction for one event
s_fov	not from obs-index available from other metadata significance radius ?		can be extracted it from the tables as it depends on energy and exp_time avoid the edge of fov ? —> homework for sure !!! estimate a typical value for the telescope instruments high 10degrees others 5 degrees back to CTA to decide what makes sense as an estimate : camera fov , subarray fov , etc …
s_region	see above !		
s_xel1	not applicable		
s_xel2	not applicable		
t_min	tstart		

t_max	tstop		
t_exptime	livetime		
t_resolution	not applicable→ the typical value from the instrument a property of the instrument		look at time sampling and ObsCore time extension if available its from the instrument
t_xel	not applicable		
em_min	very small numbers use sensitivity to define these limits from the iRF energy range		→ consider energy limits in an extension
em_max	very small numbers → consider energy limits use em_unit to describe the data unit		
em_res_power	min and max ? the one at the central position and energy ? → not applicable		em_resol would apply better depends on instrument response , etc …
em_xel	number of events ?		-> not the right place? -> extra parameter event_count give an idea of how rich is the data set .

o_ucd	not applicable		
pol_states	not applicable for cta.		Maybe for satellites otherwise use Stokes I ?

pol_xel	not applicable		
facility_name	“ctao”		
instrument_name	“cta-south” for exemple		
obs_collection	subarray ? name of telescopes ? -> more is needed for observing configuration		
obs_id	“obs-toto”		
obs_publisher_did	“ivo://ctao#obs-toto-1,” “ivo://ctao#obs-toto-2”		
target_name	object or position or null		
dataproduct_type	eventlist		does eventlist include the IRF or not ?
access_url	not cta specific		full retrieval or Datalink
access_estsize	not cta specific		
access_format	not cta specific		

proposed extension : time extension ? photon energy limits ?

observation mode

drift_scan , convergent , divergent, etc …

telescope ids etc

this goes on the description of the observing configuration

—> need to describe Observing Configuration (with help of ivoa:ProvDM ?)

—> homework

III) What to do next ?

a) make the use case discussion better shaped

b) look at the “homework”-oriented attributes

c) match cta model attributes to that work

d) restart the exercise for dl5

e) describe work done with visibility data

f) take some real examples and see how they fitr to that work : how to access real data