Cross-TOM capabilities

- Chat tool for comments, searchable, post figures

- Plotting tool: lightcurves, spectra, target visibility, finding charts, catalog cut-out service with hierarchy (e.g. give me a SDSS image, if not give me…)

- Look at what LSST will supply in alerts - difference image but not template. 1 yr past history of a given alert, allows follow-up queries for longer history

- User authorization and groups within the project (e.g. ENG groups, science sub-groups)

- Grouping lists of targets - identifying ‘favorite’ targets, building playlists

- Scientific tagging to indicate why targets and observations are required.

- Resource availability calendar, queryable “is resource available?” Single location for resources to report to their availability. Discussion of application of this in the ‘meta scheduler mode’ - the meta scheduler would need to know, but not the TOMs/users…?

- Distinction between facilities that are always available (LCO) vs those that are rarely available. May impact scheduling look-ahead time.

- Need to receive ongoing observation status and lack of resource availability. Calendar should accept users indicating when they will observe (authentication issue?)

- Interaction with resource pressure plot/API.
TOMs are seen as scientific collaborations rather than tools built by observatories. However, observatory staff may still want to build TOMs, or have access to aspects of them, e.g.

- what are others observing
- schedulability
- finder charts
- Time allocation management tools, including query capability for observatories.
Review of LCO pressure plot.
It is possible to see what is currently scheduled, and for observations in the immediate future, this is less likely to change than for more distant observations.

Current KP TOMs only schedule observations within 24hrs because only then do they know what observations they required (based on what has been done/scheduled by then) but need to support observations planned in advance.

Difficult to predict how the scheduler will handle a given request - cannot easily provide a probability that it will be done.

Question: what is the average time between making a request and a request being done? How do we understand the biases in the scheduler?
Expectation that ANTARES cannot handle all possible sources (is it just LSST?)

Some users may prefer to subscribe to everything and then filter targets at the TOM level rather than filter at the broker request stage.

Possibly have second-level brokers, perhaps for specific science areas. In parallel, develop community filters for ANTARES/brokers.

UK developing independent ANTARES-level broker with customized filter facilities (envisioned for LSST-UK users only at this stage).

Capability for users to upload their own catalogs of targets to their DB.

Blurred line between broker and TOM regarding who does the target filtering, especially if follow-up data is fed back to brokers.

Brokers need to provide a programmable framework for users to configure their own filters.
Interacting with other TOMs

How did SNe team do interactivity between PTF/LCO SNEx - common developers.

Would send data, classification information.

Iair’s solution used direct-access scripts, accepted this is not sustainable.
General interest in a ‘mystery object TOM’ to which unknown objects could be sent. How do teams in one area know where to send targets not of interest to them? E.g. SNe find an NEO.

Makes more sense to be able to send this information back up to brokers.

Need APIs to enable this...and to discuss this with ANTARES etc developers. Currently no good, common mechanism for this for all science areas. ->

Clearing house for “stuff not of interest to me” and importantly, why I think this (e.g. what data indicates this classification)

Brokers associate catalog data to help this.

Comment that VOEvent schema enables this of arbitrary size but return that this leads to technical difficulties in streaming arbitrary annotation information. Maybe provide discovery links instead?
Interfaces for citizen science portals. Several existing TOMs have CS portals, including options for CS to opt to get observations - raises questions of through which time allocation?
Data storage question: expect TOMs to have reduced data. Perhaps linked back to observatory archive?

Possible TOMs get capability to send code snippets to DataLab and get answers back rather than store all data and process locally. How do I get intermediate data products back form Datalab model?

Different observatories need to establish what data products they should provide (including timescale, e.g. quicklook vs. offline), enable users to do additional reductions if needed by providing access to necessary ancillary products, e.g. calibrations.

Expected procedure is that observatory data go to archive, not used to also being data distribution centre. Compared with the LCO model of a cloud-based archive.

Expect that obs would notify TOM that obs taken, but data may come from a separate archive facility (go get it from somewhere else)
What are the capabilities of the minimally-functional TOM?

Rachel: I have a simplified proto-type example TOM system available from a public Github repo here:

https://github.com/rachel3834/mulens-tom

It's intentionally very simple in its functionality - its intended for novice users to examine and understand how the components fit together, and to clone and adapt the capabilities however they like.

That said, it currently covers the basics of a central TOM DB, APIs for target and observation submission, the implementation of a science-strategy layer, all based around an example science use-case (which can easily be adapted).

This system is in active use (its running the Spitzer Microlensing Campaign) and I'm actively adding to the functionality, so it will become more capable soon.