AOT Brainstorming Meeting
Imperial College, London March 16th 2004

Matt Fox 19th March 2004

Present:

Imperial:	Dave Clements, Matt Fox, Mattia Vaccari
RAL:	Ken King , Bruce Swinyard, Tanya Lim, Sunil Sidher, Steve Guest
Cardiff:	Adam Woodcraft, Bruce Sibthorpe
ESTEC:	Tony Marston
MSSL:	Matt Page
IAC:	Evanthia Hatziminaoglou

Date: 16th March 2004, 10:00 GMT
Room: Rm 737 (10pm-1pm) / Rm 1004 (1pm-4pm)

Welcome, introductions and goals	Dave
SPOT demonstration and ESA's view of AOTs	Tony
Overview of Observing modes of SPIRE.	Bruce

1. **Dave Clements** commented on the overall goals of the meeting to at least bring everyone in the ICC up to speed on the state of the observing modes and any changes to the provided documentation. The overall goal was to produce a front end for the general astronomer which provided as much information as possible without bamboozling or baffling the first-time sub-mm astronomer. Therefore the available observing modes to the general astronomer should be limited and information should be on a need-to-know basis. Much emphasis was placed on the confusion caused by overloading of information in the ISO observation definition and the problems that arose when on-orbit sensitivities and performance were substantially different from those expected before launch.

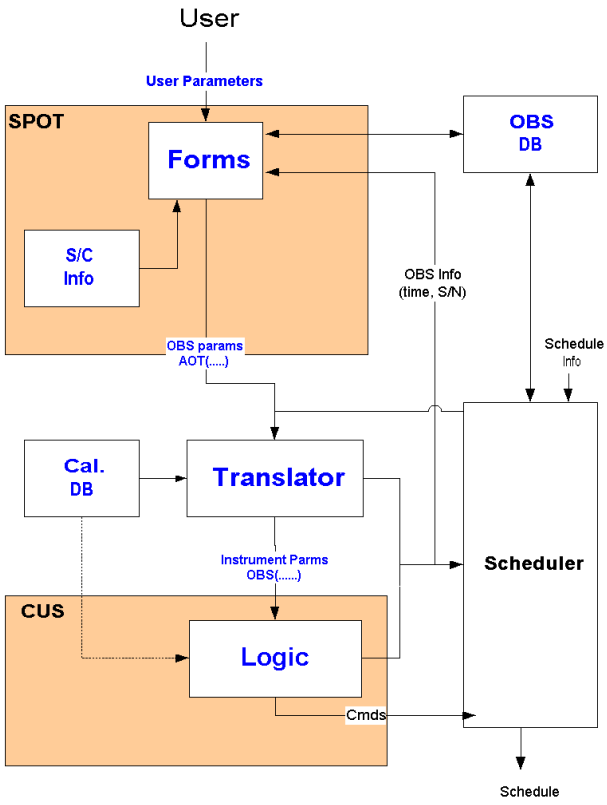
2. **Tony Marston** (HIFI representative at HSC and developer of Spitzer SPOT) presented the functionality of SPOT with a PACS proto-observing tool. Interesting features included: Name resolvers using Simbad & NED, connection to a multitude of sky views 2MASS, NVSS, DSS etc, and ability to visualise observations on these sky views.

   HSC will produce all the necessary software (written in Java) for the front end of the SPOT. SPIRE will produce a document describing the instrument parameters available to the astronomer and the necessary logic/tables plus interpolation to compute the observation times. The first version will be 'best guess' and improved when instrument knowledge is improved.

   - Open Issue: How to handle 'duplications', especially with nearly, but not, identical coordinates? Resolve name, then 'accept or offset?'? Even if the astronomer provides detailed scientific justification for slight offsets from the nominal coordinates of a source will this be taken into account by the HOTAC? It is not clear how genuine duplications and these cases can be detected, e.g. radio centroid may not be coincident with near-IR centroid.

   - Open Issue: will parallel imaging mode with PACS be shown on the tool? Imaging will be an offset from the PACS pointing. Treated as serendipitous data by SPIRE ICC.

3. **Ken King** showed a diagram (overleaf) mapping out the interconnectivity between the Herschel-SPOT, the Scheduler and CUS. A translator of the observation parameters to CUS language is required. It's not clear what form the translator will take and whether it will reside within the SPOT tool as a deliverable from SPIRE or be contained within the HCSS as add-on to the CUS.



Some issues raised during KK's presentation:

- Parallel mode with PACS - turn off some of the SPIRE detectors to allow telemetry data rate to work. How to achieve in an AOT context? This is going to be an 'expert' mode of SPIRE so only an AOT tool which constructs the instrument commands is required for parallel mode.

- The ESA deadlines for AOT deliveries will be beaten by SPIRE's own internal deadlines because the AOTs are required earlier for our testing purposes.

- Expert mode for the AOTs is required (within CUS?) to construct the instrument commands for engineering observations etc.

- Can we do some post-proposal optimisation process on a project's observing scheme once an actual date for observations is known? Yes. The scheduler will notify the astronomer of any queries that may crop up concerning a particular AOT.

- What constitutes an observation? - Different spacecraft pointings constitute a different observation (which are not constituent parts of a single raster map). i.e. different objects. However, this raises the duplication problem mentioned earlier. A science observation might require different pointings on the same object.

- Open Issue: Spitzer has used <2 degrees separation of objects for a single observation - will this be the same for Herschel?

4. **Bruce Swinyard** presented a few slides on the observing modes of SPIRE elaborating on the 'Operating Modes of SPIRE' document which all agreed was badly in need of revision.

   Issues raised during BS presentation:

- Should there be some specification for stability requirements in a specific AOT? This has implications for scheduling. Should observer be allowed to dictate the stability of the

bolometer in a parameterised form? Drift in bolometer sensitivity really quiet (0.03Hz) after 36 hours. But can certain observations be scheduled to be in this time? Probably only in expert mode will a very quiet conditions requirement be allowed. Only a handful of programmes will use this mechanism, and they can be handled in Phase 2.

- Special comments for an AOT/Observation specification which are meant to reach the human scheduler. Ultimately the decision will lie in the time allocation committee. Tony Marston made the comment that these human interjections are rarely looked at during the scheduling process.

PHOT modes

Does the n of n-point jiggle map in *mapping mode* matter? Is there a case for not wanting data from one array? Do you really want to throw away the other array data which is essentially gained for free?

Conclusion: 64 point jiggle mapping only should be made available to the general user. There is no gain in doing any less than a 64-point because even if the observer does not require the longest wavelength this pattern guarantees fully sampled maps at all three wavelengths for no increase in integration time. In other words; the dwell time on any given section of sky is identical regardless of jiggle pattern.

Input from Matt Griffin (absent) 15/03/04:

Normal user is not given any choice of set up in mapping mode - chop throw, direction are all set autom,atically. Just integration time per point for maps >40 arcmin per side.

We should highlight the drift scan going forward and back over the same area using BSM in the direction of scan. Strategic use of BSM along the scan direction will increase the dwell time on a given sky position with the same scan length.

Expert modes:
We will still need a front end for peak up mode within SPOT, but this will be an expert only mode. POF1 is used for spectrometer modes only. The meeting moved on to SOF modes as we did not have time to discuss the engineering/expert modes in detail.

SPEC Modes

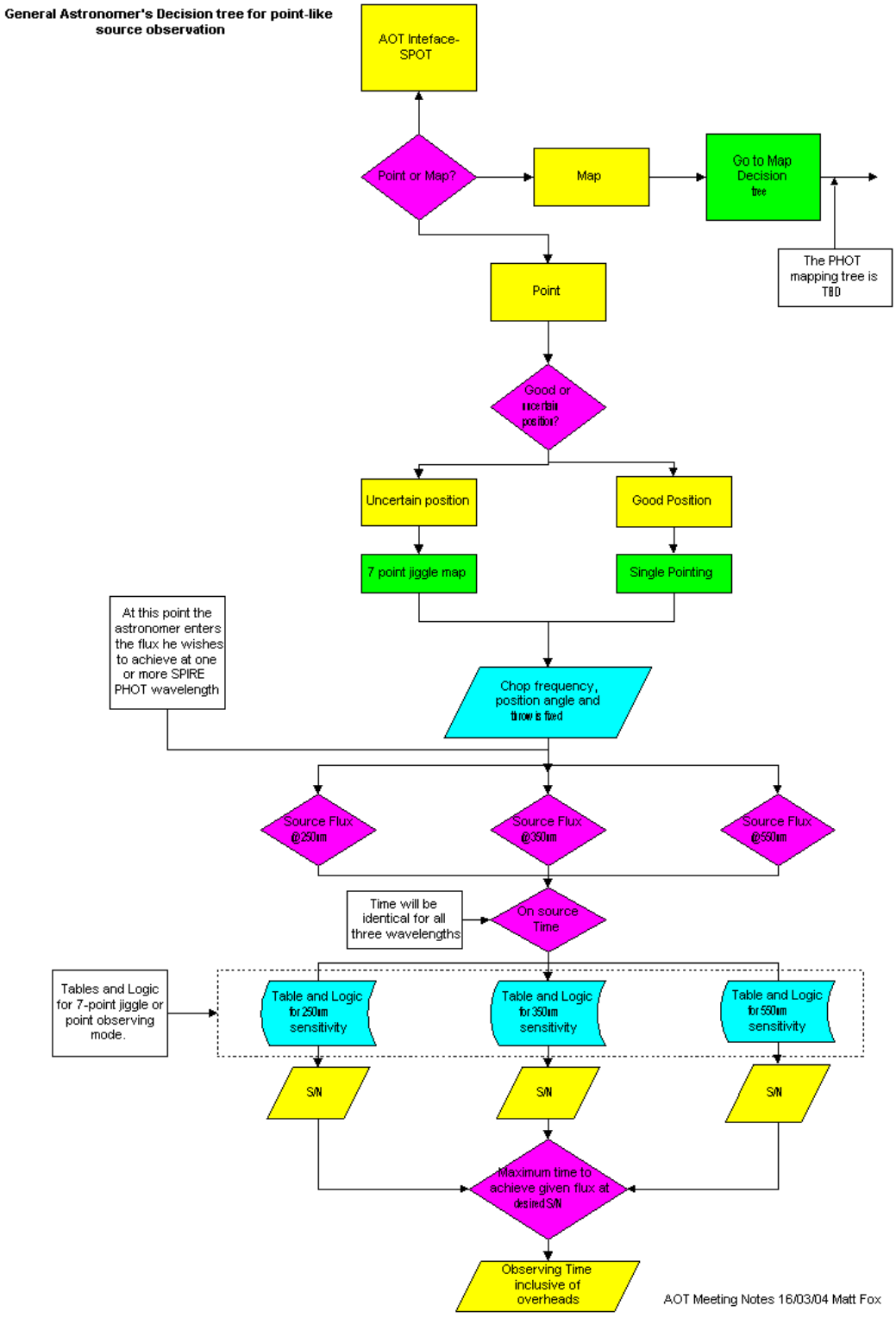
Step and integrate is only useful for lowish resolution, reserved for v faint objects (How faint is faint in this context?) 1/f noise will be increased for repeated continuous scans, so step and integrate mode is necessary for faint objects.

Mapping should not be offered at first AO. Point source spectrometry will be the only Spectrometer Operating Mode to be made available. Vignetting problems will decide the level of overlap for FTS arrays in mapping mode.

SPEC modes will be discussed in detail at a future meeting (see actions)

5. **Dave Clements** initiated the 'brainstorm' part of the meeting.

The following decision tree for point-like observations was hammered out (overleaf):



- There will also need to be a step allowing the observer to visualise the field to be observed and to set any scheduling constraints so that sources do not fall into the reference beams.

- Time is the deliverable not S/N - observers will be notified if there are significant changes in the instrument sensitivity on-orbit which would impact their observing programme.

- The observer's interface to the time estimator should look like this:

Flux	Astronomer enters this
S/N	Provided but not enterable.
Time	Astronomer enters this.
⟶	Actual time supplied inclusive of overheads (this is the deliverable)

- Question: Is calibration stable enough to be done in calibration time? Or is calibration needed on a sub-nod cycle timescale? Only resolvable in orbit. Is there any input needed from the astronomer, choosing a blank area to flash the internal calibrator.
  Conclusion: No input needed from astronomer in terms of calibration.

The brainstorm concluded with this first example AOT flow diagram.

There need to be another two meetings to hammer out the PHOT mapping and the SPEC AOTs for the Herschel-SPOT interface

Next Meetings will splintered:

Action: Marc Sauvage to ask Pierre Cox to get together for SPEC side to meet with LAM and Lethbridge.

Action: MF and DC to organise the PHOT mapping side.