8. Appendices

These appendices are a patching together of various inputs. There are two main sections. The first (I.) collects information on how the proposal review or time allocation process works in various other multi-partner observatories (A-F). The purpose in collecting this information was to get ideas for ALMA, to learn how the interests of different partners are addressed, and to provide for discussion some pros and cons of various solutions (G.). The second issue (II.) is the nature of the Regional Support Centers (RSCs). We will present the results of discussions in the various communities.

I. The Time Allocation Process

We describe below the current structures of, and in some cases, some historical information on, the TACs for IRAM, JCMT, HST, and Gemini. We still hope to get descriptions of the ESO TAC.

A. The IRAM TAC (from Malcolm Walmsley)

IRAM has a single TAC which produces recommendations on the scheduling of the 30-m and Plateau de Bure telescopes. It meets twice a year to schedule the following 6-month period. There are 2 german representatives, 2 french, 2 spanish, and 2 "externs". An attempt is made to have a broad range of competences available with roughly equal representation for "galactic" and "extragalactic" studies. The committee receives proposals typically three weeks prior to the meeting and is expected to send "pre–grades" to Grenoble just prior to the meeting. Members have to read currently all the P.deB proposals (roughly 60 in Sept. 2001) and half of the 30-m (roughly 120 in Sept. 2001). Typically members are rotated off the committee after roughly 3 years. Grades are usually A(accept), B(OK if time), and C(reject) with the B-proposals being used to give the scheduler some flexibility. The TAC itself is supposed to judge proposals purely on the basis of scientific merit. Any other considerations are taken into account by IRAM.

This latter statement means in particular that the IRAM Director (not the TAC) checks whether the recommendations of the TAC are consistent with a proportional distribution of observing time between the partners and , if not, adjusts things. As far as I know, this system has not led to more than the inevitable fraction of unhappy observers or groups of observers but it is difficult to know in any objective fashion. My impression is that in a large fraction of cases, things have been left alone but probably, that has not always been so.

B. The JCMT Time Allocation Process (from John Richer, additional comments from Chris Wilson and Ewine van Dishoeck)

These notes are based on my own experience as a member of the UK and International time allocation committees. But notes on how the process operated in the early years, and on details of Canadian and Dutch issues, may not be so accurate! Comments welcome from Ewine and Chris.

1. The JCMT is funded by the UK (55%), Canada (25%) and the Netherlands (20%), with local support of the University of Hawaii (UH).

2. Time allocation is done twice a year, with proposal deadlines at the end of September and March; the semesters run February-July and August-January. Proposals are submitted as LaTeX templates and Postscript by email, and are processed by scripts at the Joint Astronomy Centre to create a simple database of proposals. Successful proposals are allocated to specific range of submillimetre 'weather' bands based on the atmospheric opacity. Successful proposals are also required to submit a phase-2 style observing template which specifies the observations to be undertaken, to allow for service observing to be undertaken without the PIs being present.

3. Proposals are submitted to JAC, except those from UH which are described later. They are divided into 4 groups - UK, Canada, NL and International - based on the institutional affiliation of the PI, and of the co-Is. The rules for this are quite complex! A proposal is international if none of the investigators qualify as working at UK, Canadian or Dutch institutions. Most JAC staff are on UH contracts and count as international. If a proposal has investigators from two or more partner countries, they can choose which TAC to submit to, but they must not submit the same proposal to both TACs unless they make a special case as to why both TACs should assess the proposal. This is to avoid multi-national teams submitting the same proposal covertly to each national TAC to maximise the chances of getting time. But it does not preclude multinational teams submitting cases for large time allocations to multiple TACs provided they make their strategy clear - this gives the national TACs the opportunity to liaise with each other during the assessment process.

4. Technical refereeing to assess feasibility is performed by the Joint Astronomy Centre (JAC) staff in Hawaii.

5. The JAC is investing in software development to automate the proposal handling, observing queue management and data management: this Observatory Management Project (OMP) will go live gradually over the next two years. It will create a more formal Phase 1/Phase 2 proposal preparation system and

facilitate better automated communications between PI and observatory, and in principle provide higher data quality and better data products.

6. Each of the three partner countries, and I believe the University of Hawaii (UH), has its own separate time allocation committee (TAC). They report to the one International Time Allocation Committee (ITAC). The national TACs meet first and consider their own national proposals. They have been informed by the ITAC roughly how much time they have to allocate. The national TACs make their recommendations to the ITAC regarding which proposals they wish to give time to. There is an expectation that the national recommendations will cover LST ranges and weather bands in a sensible manner.

7. The UK TAC consists of typically 6 people. Each proposal is assigned to a first and second assessor on the TAC. An external, potentially international, referee's opinion is sought on each proposal. Each TAC member scores each proposal based on their own reading of the proposal, the referee's report, and the technical assessment; the expert assessors on the TAC may also write comments for consideration. The scores are combined to create a first-cut ranking of the proposals before the TAC meets face-to-face. At this meeting, each proposal is discussed, with interested parties leaving the room if necessary; scores may be revised as a result of discussions. Each proposal is then either rejected or allocated time to a particular weather range. Proposals needing different frequencies and instruments may get multiple allocations to different weather bands.

8. About a week after the national TACS, the ITAC meets: it is composed of 2 UK members from the UK TAC, one member from NL and one from Canada, and a Secretary from the JAC. Formally, I believe, all time is allocated by the ITAC, and the the national TACs simply report their own recommendations to the ITAC. In practice, changes to the national TAC recommendations are rare, but conflicts do arise - see below.

9. This is how the time is divided up. After allocating engineering and director's time requested by the JAC (based on a written request from the telescope director), 10% of the remaining time is first allocated to the University of Hawaii. UH do their own time allocations internally without reporting to any committee. However, there is an expectation that UH send their allocated proposals to the International Time Allocation Committee (ITAC) for information. The International proposals are then considered by the ITAC, and these are dealt with in a similar way to UK proposals, including external refereeing by one person not on the ITAC. Based on the quantity and quality of the international proposals compared to those wining time at the national TACs, the ITAC decides how much international time to allocate. Historically this has been around the 10% level. Finally, the remaining time is split 55:25:20 between UK, Canada and NL. If all has gone well, these national time allocations will match the allocations by the national TACs, and the job is nearly complete. The ITAC must make sure that the time it allocates is balanced to cover LST and expected weather ranges, and then hands over the agreed allocations to the JAC for scheduling.

10. The ITAC must identify and resolve any conflicts between national time allocations. Although rare, these issues can be sensitive, even with only 2 or 3 countries involved. (parenthetic note: if ALMA were to adopt this TAC model, this would be a serious problem). Conflicts arise from separate teams wanting to observe the same fields or attack identical science goals (eg deep blind surveys, GRBs and other targets of opportunity). There are no hard and fast rules as to how the ITAC deals with this in my experience, and I am afraid I have not seen the official 'rules of engagement' for the ITAC (if they even exist!). In practice, there are several outcomes possible. The ITAC may allow duplicate science or even duplicate observations to be scheduled: the justification for this is to allow competition - but this is probably the final resort ini case of stalemate between national TACs. Or it may require/request the teams to form a collaboration and share data and publications. Or it may try to reject a proposal it perceives as palpably weaker (although the national TAC in question would have to agree to this).

The ITAC also deals with cross-TAC proposals if there are any: each national TAC states its own ranking of the proposal and how much time it recommends be allocated. Problems can arise if one national TAC rates a proposal much more highly than another, especially if a large amount of time is required to achieve the science goals.

11. There are no 'Key Projects' in the UK/ITAC system. However, ambitious proposals can request Long Term Status (LTS) and ask for multiple blocks of time to be scheduled over several semesters. These proposals are also allowed to write longer scientific cases, and may be subject to more intensive refereeing: the principle is that large blocks of time need stronger scientific justification and refereeing. Several major JCMT success stories have resulted from the large projects: HDF, 8-mJy survey, Galactic Centre survey, Canadian star-formation surveys, etc.

12. Generally, a proposal is considered terminated at the end of the semester which it was allocated to, regardless of whether the observations have been completed. Investigators must reapply for time if needed. However, the UK TAC and ITAC (also maybe in Canada and NL?) may 'star' a small fraction of highly-rated proposals, and these are then automatically carried over to succeeding semesters to allow them to be completed. This is a vital tool for submm astronomy, because long periods of good weather are rare and unpredictable.

13. The ITAC can allocate override time for targets of opportunity - if the right conditions occur, the

allocated observer loses his time and the target of opportunity program is conducted. Efforts are made to ensure the affected observers programme can be completed later.

14. All UK and International proposals, whether successful or not, are sent a short letter containing feedback on the proposal. (I don't know if this applies in Canada or NL).

15. Interesting historical note: in the early few years of JCMT, there was a single Time Allocation Committee which considered all the proposals for the telescope on a competitive basis. I was not on the TAC at this time. After a few years, the process split into the natiional TAC system described above. I think this is a significant point, but I can't comment on the reasons as to why this happened. Perhaps Ewine or Chris can comment?

Additional comments from Chris Wilson:

I can add a couple of comments to John's information on how the JCMT TAC operates. In Canada, we ask for TWO letters by experts, generally one from within Canada and one from outside. Other than that the operation of the TAC (ranking, TAC members assessing specific proposals, etc.) is pretty much as John described.

In addition, Canadian Ph.D. students can request "thesis status" for observations that are important for their Ph.D. thesis. If a student is awarded thesis status, their project will remain in the observing queue until it is finished, even if this takes 5 or 6 semesters. We don't have the UK system of "starred" proposals, so only thesis projects and projects awarded long term status can carry over automatically.

Regarding the split from one TAC to 3 TACs, this happened literally within a few months of my arriving back in Canada, so all I know about it is second hand. I served on the Canadian TAC during the early years after that split, and so talked to people who had known the single TAC situation. What I remember hearing is that particularly the Canadians, but perhaps the Dutch as well, were unhappy with the single TAC because even then the scientific interests of the communities were somewhat divergent (the UK did more continuum work at that time and the Canadians more heterodyne, for example). So there seemed to be a feeling that the UK, as the major partner, were driving the scientific direction of the TAC in ways the Canadian community did not like, even though the Canadians were definitely getting their share of the time. I know people seemed much happier with the 3-TAC system soon after it was implemented.

This type of thing may not be such an issue for ALMA, because we will not have a single majority partner. I know Canadian astronomers have thought a bit about whether, if there were two partner TACs, we think we could function well within a single TAC with the U.S., and the general consensus is the scientific interests of the two communities are similar enough that we think this would work. We haven't thought much about how well, say, a single North America-Europe TAC would work yet.

Additional comments from the Dutch Perspective from Ewine

- the Dutch JCMT TAC is joint with our other telescopes, i.e. La Palma optical telescopes and Westerbork. Thus, it is a mixed group of astronomers with few JCMT experts. However, they know the Dutch situation well. We do not ask for outside referee reports. The TAC provides a short feedback. We do not have starred proposals, nor long-term status. However, when PhD students are involved, there is an implicit understanding that the student will get sufficient time to finish his/her thesis. However, the proposal has to be re-submitted each round and the student has to show progress and papers. For the rest, it works the same as for the other JCMT partners.

- I was actually part of the group of "rebels" who argued for the split of the TAC in three separate TACs. I remember very well the talks Frank Israel and I had with the then chair, Mike Edmunds. It worked because the Canadians soon joined forces for this "breakaway". The main frustration was indeed the fact that there was a single dominant partner, UK, whose philosophy for science with the JCMT and allocating time was totally different from those of the other two minor partners. For example, the Dutch prefer long, solid PhD-type projects which were considered "boring" by the UK, who favored at that time very short, mostly continuum projects. So it was virtually impossible for us to get sufficient time for those projects that our community considered important. This was actually even worse for the optical La Palma telescopes, which is a 80%-20% collaboration and where the Dutch proposals always ended up at the bottom! Note that we do not have this problem at ESO where there is not a single dominant partner; there the joint TACs work quite well, and the Dutch get on average more than their share.

C.The HST Proposal Selection Process (from Neal Evans with comments from Peter Shaver)

The Space Telescope Science Institute runs what may be the most extensive proposal evaluation in astronomy, with over 1000 proposals. The oversubscription factor is typically 6 to 8. The proposal reviews are held in the area of Baltimore, either at STScI or in a nearby hotel. The TAC consists of a Chairperson and the Chairpersons of a large number of panels. For the recent Cycle 11 reviews, there were 11 panels. While European astronomers are contractually guaranteed 15% of the time, this has not been rigidly enforced. However, I have been told that European astronomers always have gotten at least 15%.

The TAC responds to overall guidelines from the STScI about the balance of large and small projects. The TAC meets first to review large proposals and special proposal categories (treasury, legacy, ...). Then the panels meet, having received a provisional amount of time from the TAC that they can assign. Since Cycle 9, the panels have been quite broad (e.g., in Cycle 11, there were 11 panels reviewing 5 broad areas). For the rest, I will describe the overall process for Cycle 11, as described in a recent Newsletter, with some notes on experience from Cycle 10 from my service on a panel and from comments by Meg Urry, who ran the reviews for some time. Usually there are two "twinned" panels covering the same area. In Cycle 11, there was only one panel for solar system, but two or three for all other areas. Proposals were then assigned to the panel that did not have a panel member as a PI or co-I. Each panel had 9 reviewers. Efforts were made to have a broad distribution of expertise on each panel, to include a theoretician, and to include a European. Overall, the ratio of US to European members was 6 to 1. At least 1 and usually more of the the panel chairs was European. No STScI staff can be panel members.

Each panel had at least 80-90 proposals to review. The panel members were assigned a subset of these proposals to review before the meeting and were strongly encouraged to arrive with proposal reviews available in electronic form. Two panel members reviewed each proposal. All proposals were ranked by all panel members. The ranking was provided in advance and averaged. Triage was used to eliminate proposals with initial rankings in the bottom third and focus attention on the proposals more likely to succeed. It is possible to revive proposals that have been triaged by panel decision, but these rarely get time. At the end, each panel provided a list of proposals that fit into their time allocation. After the panel meetings were over, the TAC met again to review the panel decisions and make adjustments when necessary for balance.

Is this a good model for ALMA? We can ask if the partners are satisfied. Meg Urry says that in her experience, the fraction of time going to European proposals was always at least the contractural 15%, but this emerged from the proposal process rather than being enforced from above. How is this perceived in Europe? That is a question better addressed by our European colleagues. I have asked Peter Shaver to assess this. Would this work in a 2-way or 3-way partnership of equals? It is one thing for a 15% partner to get 15% or a little more. It may be less comfortable for a 50% partner to get systematically more than 50%. The ALMA equivalent of the TAC might have to force some more balance over some time constant. Is the panel method a good one? My experience was mixed. I think that panels that meet face to face are much better than mail reviewers. However this is expensive. The broad panel areas, with mixed nationalities, foster a science-first attitude, which I prefer to nation or region-based panels. However, I found the breadth and basis set of topics uncomfortable. There were too many that I knew nothing about, while there were proposals in other panels I would have known more about. This might be easier for ALMA, which may have a narrower range of topics to deal with.

Additional comments from Peter Shaver

"In proportion to the amount of time ESA receives by right on HST (15%), the same proportion of panellists are provided by ESA to the annual HST TAC. The contribution includes panellists and chairs. The TAC chair has never yet been an ESA appointee but could be in principle. They are chosen by the ST-ECF representative in discussion with the STScI Science Polices Division. There has always been excellent agreement on the choice of members. The members are chosen mostly for their previous involvement in HST science, although not necessarily as a PI. With the recent introduction of Theory proposals, this becomes less important. The ESA members are fully integrated into the panels and fully share the work load. HST panels are usually 8-10 members and there is 1, or at most 2, ESA members per panel. They also consider Archive proposals which receive US funding, but for which non-US PI's are not eligible to apply. The only difference between ESA and STScI chosen TAC members is that they are separately funded.

The European HST allocation has always been over the 15% mark measured both in terms of PI's and orbits. The ratio submitted/awarded proposals and orbits for Europeans has looked almost identical to US figures. I have never detected any gripes. My impression is that if Europeans submitted more proposals they would get more time!"

D. The Gemini TAC (from Mark Gurwell)

The Gemini Time Allocation Process is described in great detail both on the Gemini website and in several documents available from that site, particularly "Observing with a 21st Century Ground-Based Telescope - or How to do Unique Science with the Gemini Telescopes" by P. Puxley (Gemini preprint #13).

The Gemini project has developed a two-path approach to observing, by operating with a "classical" schedule (e.g. scheduled nights blocked out for specific programs from accepted proposals, with astronomers trekking to the telescope to perform the observations) and "queue-scheduled" programs, where the observatory staff takes on the responsibility for performing observations from previously submitted observing execution files, allowing programs to be better matched to the available conditions. For Gemini it appears that the split is roughly 50-50 between to two "type" of scheduling. For the purposes of ALMA it is expected that essentially all observations will be of the queue type.

1. Proposals are solicited by each National Gemini Office (NGO) or National Time Allocation Committee

(NTAC) from its own user community, twice yearly, and will be coordinated to be simultaneous in all countries.

2. Each NTAC produces two ranked lists of those proposals its recieved in order of scientific priority (one for classical and one for queued), along with logistical constraints (e.g. preferred dates), and estimates of recommended and minimum time needed for any meaningful scientific result to be obtained. In addition, the NTACs may designate certain programs from the previous semester to be carried over if they were not fully executed. NOTE: this means the default is to not carry over incomplete programs.

3. The various lists are merged into draft classical and queued schedules with a number of constraints involving the fractional allocation to the different partner countries, host institutions (UHawaii or Chile), the International Gemini Office (IGO) science staff, and an allowance for director's discretionary and engineering time. The draft queue contains a reasonable distribution of programs requiring different conditions, e.g. it cannont contain only programs which require excellent seeing, and as such it is oversubscribed. This preliminary merging is the most tricky and interesting step; see below.

4. The International Time Allocation Committee (ITAC) consists of representatives from the NTACs as well as the IGO itself. It meets to consider modifications to the draft schedule and the draft queue required by conflicts (read multiple proposals for same source(s) from different countries). The ITAC is asked to identify highly ranked proposals that can be potentially undertaken as cross-partner collaborations, which I take to mean that they try to push international collaboration rather than choose one country's group over another, particularly for cutting-edge observations. The ITAC recommendations are advisory to the Gemini Director at each site.

5. The final schedule is prepared and approved by each director.

The preliminary merging is an interesting phenomenon. It is driven by the concept of the "merging sequence". The merging sequence is a sequential list of the Gemini partners as well as the host site, and describes the order in which proposals from the partners are selected. The frequency with which each partner occurs in the sequence is roughly proportional to their involvement in the project. Each entry corresponds to a specific amount of time, and thus the ranked lists from each country can quickly be distributed into the queue by running through the list and allocating time to the highest ranked program not already scheculed for that country. The queue preliminary merging also includes a running tally of the "weather" requirements of accepted proposals, and limits overallocation to 30% for each type of requirement based upon site statistics, e.g. if only 20 nights per semester are expected to have the best seeing, 26 nights of queue-scheduled proposals requiring the best seeing can be accepted, and therefore there is a near inevitability that some accepted proposals will not get executed. These proposals will not be carried over to the next semester unless requested by the appropriate NTAC.

E. The ESO TAC (via Peter Shaver)

"At ESO there is no [requirement] to allocate the time to the individual memberstates strictly in proportion to their contributions. Up to now the ESO member states never had strong complaints about the way the available time had been allocated. As for the time available to the National telescopes (1.5mD, SEST), the time allocation was always done for completely separate blocks of time in a totally separate process under the responsibility of the national institutes. That is, ESO never interfered in the scientific evaluation and selection process of these proposals. In case of time co-ordination problems the cooperation between ESO and the National partners always was working fine.

Considering this background, it may be feasible [for ALMA] to have separate TACS for the individual partners, but only under the assumption that each partner is assigned a completely separate block of time that they can use as they want. However, if many partners have one common pool of time of which they can use a certain percentage, this approach of having one TAC per partner certainly will not work.

A big advantage of having one common TAC for the complete amount of time is, that this allows a better inter-comparison of the scientific merit of the proposals and a more uniform evaluation of the proposals (as experience shows, each TAC has a different way of judging proposals even if the grading system to be used is identical). Thus in the end this is to the profit of the quality of the presented science."

F. The CFHT TAC (from Pierre Cox)

The TAC of the CFHT (Canada-France-Hawaii-Telescope) is partner-based. Each country has a TAC with 4 members for Canada, 8 for France, and (TBC) for the University of Hawaii (UH). Each TAC attributes a number of nights which is proportional to their quota. The TACs meet twice a year. The final selection (list of proposals with ranking) from each partner TAC is sent to the CFH in Hawaii, with separate lists for the dark and bright times. Based on the recommendations of each partner, the CFH (in practice one person who is in charge of this) will make an observing schedule which should be acceptable to each partner and which takes into account as well as possible potential conflicts such as right ascensions problems (e.g., cosmological programs all asking for the dark time in march..) or practical constraints (e.g., a new instrument cannot

be mounted every second day) etc.... This preliminary schedule is then discussed, readjusted if needed and finally approved by a committee composed of 6 members (with two representatives for each partner country).

The above description corresponds to the 'classical' observations where the observer comes to the telescope. For service mode observations (which represent about 1/3 of the observing time and which is increasing over the years), the national TACs send a list of proposals ranked in order of scientific merit specifying the number of observing hours for each proposal. The scheduling of these service mode observations depends of course on the observing conditions. The time is distributed throughout the semester in such a way that each partner ends up with a number of observing hours in direct proportion to their quota and to the numbers of hours they have allocated for the service pool.

One potential difficulty with the above partner-based TAC is that it has complicated/discouraged scientific collaborations between partners (there seems to be a record of bad experiences over the last decade). The surveys such as the successful CFRS was organized in a rather uncertain fashion by requesting again each semester observing time both on the french and canadian TACs with of course no guarantee of coordinated or coherent responses. The CFRS has been successfull largely because one of the members (O. Lefevre) was based in Hawaii and had access to discretionary time. The survey CFH12K has been less successful because it was granted time on the french side but not the canadian side and only half of the originally proposed survey could be performed. One positive aspect of the partner-based TAC is that the load for the TAC members is less than in the case of subject-based TACs.

G. Summary with Pros and Cons

While some descriptions are lacking, we can clearly see two broad categories of TAC structures: Partner-based TACS (JCMT-style); and Subject-based Panels (HST style) that incorporate membership from all the partners. In each case, there probably must be an overall TAC (the International TAC for JCMT, the TAC proper for HST) to sort out conflicts and establish overall priorities.

Here is a brief list of pros and cons for each broad style. These should be added to and discussed at the telecon, with the goal of finding the best way to maximize pros and minimize cons in whatever final structure we recommend.

Partner-based TACS

Pros:

1. Issues of partner parity are minimized (unless the international TAC takes a strong role in deciding between competing proposals). 2. Different partners can have different scientific priorities, choosing to invest large amounts of time in key projects or not, ...

Cons:

1. Can work against collaborations among scientists from different partners. 2. May produce duplicate science (unless the ITAC takes a strong role ...). 3. Multi-partner key, legacy, etc. programs are not obviously handled.

Subject-based TACS

Pros:

1. More expertise on subject-based panels. 2. Can favor multi-partner collaborations.

Cons:

1. Issues of partner parity can arise if scientific decisions to do produce an even split. 2. The overall TAC has to decide time allocations among subjects.

II. The Regional Support Centers

We present first a preamble and series of question posed to the North American "community". These were sent to the NRAO Users Committee and members of the old Millimeter Array Committee (MAC) by Neal Evans. They were sent to the Canadian ALMA Science Steering Committee by Chris Wilson. Chris and Neal tabulated responses, which are summarized in items C. and D., after the summary of European considerations in B.

A. Options for the North American Regional Support Center

This message is an attempt to start some discussion within the North American community about what they would like to see in a Regional Support Center for ALMA. In the current conception, there will be such RSCs in Europe and North America at least. There are likely to be such centers in Chile and Japan as well. The ALMA Scientific Advisory Committee (ASAC) has recommended that each RSC have