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# EUROPEAN SOUTHERN OBSERVATORY

ORGANISATION EUROPEENNE POUR DES RECHERCHES ASTRONOMIQUES  
DANS L'HEMISPHERE AUSTRAL

**FOR  
APPROVAL**

**VOTING PROCEDURE:  
Simple majority**

## COUNCIL

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### VLT/VLTI Science Operations Policy

## VLT/VLTI SCIENCE OPERATIONS POLICY

### 1. Introduction

The purpose of this document is to define the policies and procedures which will be applied for time allocation at the VLT/VLTI. Potential proposers are invited to read it carefully.

The VLT/VLTI Facility is offered in two modes: one with visiting astronomers present at the telescope, overseeing and guiding the activities of the observation staff (Visitor Mode) and one where observations are acquired by observatory staff on the basis of predetermined sequences of operations (Service Mode).

To optimize the scientific return while adjusting the VLT/VLTI schedule to the prevailing atmospheric conditions, it is intended to implement Service Mode observations for at least 50% of the available time. At least 40% of the available time will be reserved for Visitor Mode observations. These figures may be subject to periodic adjustments, depending on the experience gained at ESO and the evolution of the community demands.

During the early VLTI science operation the available UTs and the offered AT baselines will be predefined in the Call for Proposals for each semester. The ESO Directorate will determine the number of UT nights to be allocated to VLTI operations in consultation with the OPC Chair and on the basis of the VLT/VLTI pressure factors and the relative scientific merits and feasibility of VLT and VLTI programmes.

### 2. Proposal Submission

For each observing period a Call for Proposals for the Paranal observatory will be issued on the Web one month before the deadline for submission: April 1 and October 1 for the semesters Oct-Mar and Apr-Sep respectively. The Call for Proposals will inform the community about the available facilities and provide the necessary information and material for the electronic submission of proposals.

Phase 1 requires the proposer(s) to fill in the ESO application form for telescope time. ESO will provide software tools (such as instrument exposure time calculators) to support the Phase 1 process.

Applicants will be requested to specify on the Phase 1 form whether they are requesting Service or Visitor Mode observations. This request will be approved or rejected by the ESO Directorate on the basis of OPC recommendations and operational constraints.

As a rule, programmes with extreme requirements on observing conditions will be conducted in Service Mode.

Requests for Service Mode observations should be indicated in hours.

Applicants for Service Mode observing time will need to include in the time request all the operational overheads needed for the execution of their observations, which will be published in detail in the Call for Proposals. Standard calibrations described in the Calibration Plan of each instrument will not need to be accounted for. However, any special calibrations not included in the Calibration Plan must be taken into account at the time of computing the requested time.

Each proposal should identify a single individual who will act as *Principal Investigator (PI)* and will be responsible for the proposed scientific programme. The PI will be the contact person for all communications with ESO, including the data delivery.

In both, Service and Visitor Mode, the astronomer will interact with the VLT/VLTI instruments through templates. These, by definition present a restricted set of telescope parameters to the astronomer. It should not be the norm that astronomers consider using ways not described by templates. If some innovative science programme requires the development of new templates or goes outside the template structure, this would have to be requested in the proposal for feasibility assessment. Proposers will have to contact USG in advance.

Proposals for observing time may be submitted by scientists from any institution. However, ESO will only grant financial support to astronomers affiliated to institutions in the ESO member states.

ESO will support only one observer per program. If a second observer is required an authorization will have to be asked to the Paranal Observatory and in case of acceptance ESO support will be limited to transportation from/to Antofagasta and to full board on Paranal.

### **3. Scientific Review of Proposals**

After receipt of a proposal at ESO, the form will enter into a computer database *exactly as submitted by the proposer*. Therefore it is essential that this form be filled out in strict accordance with the accompanying instructions. Any incomplete proposal will be returned to the PI with a statement explaining the reason for its rejection.

The review panels and OPC will rank the proposals according to the following selection criteria:

- The scientific merit of the proposal and the importance of its contribution to the advancement of scientific knowledge.
- The need to ensure that the ESO community remains at the cutting edge in all leading areas of astronomical and cosmological research.
- Evidence that detailed plans exist for complete and timely data analysis, and that the proposing individual or team will have sufficient time and resources to carry out the analysis.

ESO will assess the technical feasibility of all observations before scheduling them. ESO will also assist the OPC and OPC panels upon request.

The policy for proposals presented by non-ESO-member state applicants is as follows:

- a) The term ‘non-member state proposal’ should apply by definition if at least 2/3 of the applicants are not affiliated to ESO member state institutes.
- b) The following criteria will be adopted in evaluating non-member state proposals:
  - The proposal has to be scientifically outstanding.
  - The required telescope/instrumentation is not available at any other observatory accessible to the applicants.
  - If similar proposals of ESO members states and non-members state proposals are rated equally, preference will be given to the ESO member state proposals.

This policy does not apply to the host state whose participation is regulated by the ”Interpretative, Supplementary and Amending Agreement” to the 1963 Convention.

#### **4. Allocation of Observing Time**

The OPC will forward its recommendations to the ESO Directorate who then prepares the observing schedule. The final telescope time distribution is the responsibility of the Director General. Observing time allocation is primarily based on the scientific merit of proposals. Consideration may be given by the Director General to issues of balance in selecting among proposals of equal merit near the cut-off line. At any time the ESO Directorate may introduce minor modifications in the schedule, if required.

Applicants will be informed about time allocation at least three months before the beginning of the observing semester applied for. All proposers will receive the OPC written comments to their proposals. Programmes are scheduled following the OPC recommendations and operational criteria meant to maximize the science usage of the telescopes.

In the process of telescope time allocation the following categories of observing time have to be considered:

- *the regular observing time*  
corresponds to the largest fraction of the total time available each period for observations.
- *the observing time for ‘Large Programmes’*  
Up to 30% of the overall VLT/VLTI observing time is dedicated to Large Programmes each requiring at least 100 hours of telescope time. This 30% limit is not intended instrument by instrument or telescope by telescope, but globally over the whole VLT time. In the case of VLTI, the 100 hours limit results from the sum of the time over all the involved telescopes. Large Programmes should have the potential to lead to a major advance or breakthrough in the field of study, have a strong scientific justification and a plan for a quick and comprehensive effort of data reduction and analysis. The final results of Large Programmes (reduced and co-added data, catalogues, etc.) are to be delivered to the ESO Archive.

- *the observing time for Public Surveys*  
Public Surveys are to provide raw, and science grade data, and data products meeting the scientific needs of the community. At least 70% of the observing time at the survey-dedicated telescopes (VST and VISTA) is to be used for surveys. The policy for Large Programmes applies to Public Surveys at other telescopes. The procedures for Public Surveys are described in a separate document (Appendix 1).
- *the Guaranteed Time Observations (GTO)*  
GTO arises from contractual obligations of ESO vis-à-vis Consortia having provided hardware or software. GTO policies are described in a separate document (Appendix 2).
- *The Director's Discretionary Time*  
refers to a maximum of 5% of the available VLT/VLTI observing time.  
Requests will have to be submitted to the Director General.  
Director Discretionary Time will be preferentially assigned to scientifically outstanding proposals whose execution is time critical and/or offers the possibility of anticipating important discoveries which may be missed if subjected to the time delay introduced by the OPC evaluation.
- *Target of Opportunity (ToO)*  
There are three categories of Target of Opportunity requests which have to be considered:
  - 1) Target of Opportunity (ToO) requests concerning unpredictable sudden astronomical events which require urgent or immediate observations. If recognized by the Director General or the Director of Paranal as having high scientific merit, observations for these requests will be scheduled on short notice. If necessary, current programmes will be interrupted. The observations will be conducted in service mode.  
  
If several requests concerning the same ToO event and asking for the same observations are submitted by different groups, in principle the request received first will be considered.
  - 2) ToO Programmes submitted to the OPC, requiring observations of transient phenomena or their follow-up, which were recommended by the OPC.. At the time of occurrence of an event, the PI of such programmes will have priority to obtain these observations provided that a specific request for the actual observations to be carried out is submitted in time. The observation strategy should be the same as described in the proposal submitted to the OPC. The observations will be conducted in service mode and, in exceptional cases, current programmes could be interrupted.  
Any request with exactly the same scientific goal and aiming at observing the same object, presented by other groups at the time the event occurs, will be rejected by ESO, except if it is a co-ordinated project in collaboration with the PI of the accepted OPC programme.
  - 3) Rapid Response Mode ToO programmes whose proposals have been submitted to the OPC and approved by the Director General for the automatic observations of transients upon receiving encoded alerts from satellites or robotic telescopes.

- *the Technical Time*  
is set aside for commissioning, maintenance, up-grades and tests of telescopes and associated instrumentation. Any unused Technical Time will be absorbed by science operations in Service Mode.

## 5. Observations

Only observations corresponding to officially approved programmes, either recommended by the OPC and approved by the Director General, or part of the Director's Discretionary Time, as well as Guaranteed Time observations will be executed. Any change with respect to such approved observations will have to be authorized by the ESO Directorate upon requests to be submitted to USG at least 2 weeks in advance of the scheduled observations. The same applies to back-up observations or night-filling observations that the PI would like to undertake.

The execution of all programmes (ToOs included) goes through the generation of a series of observation descriptions, called Observing Blocks (OBs). These OBs describe all aspects of each of the observations, including instrument set-up, telescope position, exposure time, detector setup, requested conditions, etc. No other OBs than those corresponding to an officially approved programme will be executed.

### 1. Service Mode

On the basis of the OPC ranking, the programmes to be conducted in service mode will be subdivided in the following categories:

- A Programmes highly ranked by the OPC:  
All possible effort will be made to execute all the OBs corresponding to the programmes in the requested observing period.
- B Programmes well ranked by the OPC:  
Best effort will be made to have these programmes conducted in the requested observing period.
- C Filler programmes selected from below the OPC cut-off line: OBs will only be executed if the observing conditions do not permit to conduct observations for programmes within Categories A and B.

For category A programmes, ESO retains the right to declare a programme “substantially complete” or to carry it over to at most the next useful period.

In all cases observations will be subject to the specific requirements of the programmes, in particular with regard to seeing, and the prevailing meteorological conditions at Paranal.

The observational constraints as defined in the Phase 1 proposals are binding for Phase 2 preparation. Any change will have to be timely requested and authorized by the ESO Directorate.

For all observations to be conducted in Service Mode, the details of the observations will have to be submitted in a Phase 2 process. During Phase 2, astronomers will create OBs with ESO software tools at their home institutions and then submit these OBs to ESO in co-ordination with the User Support Group of the Data Management Division.

## **2. Visitor Mode**

Programmes recommended for time allocation by the OPC, but not conducted in Service Mode, will be scheduled at fixed dates with the ‘visiting astronomer’ (PI or CO-I of the corresponding programme) present at the telescope during the observations.

In Visitor Mode, OBs should also be generated in a Phase 2 process well before the start of the observing run. However, OBs may be modified at the telescope in order to maximize the scientific return of an approved programme to adapt in particular to the prevailing meteorological conditions.

Under exceptional circumstances, the Director of Paranal may decide to interrupt Visitor Mode observations to allow Service Mode observations.

## **6. Data Products and Data Analysis**

ESO will execute and maintain a calibration plan for all VLT/VLTI instruments. The calibration data resulting from this plan shall be made available to the ESO community. ESO will also use this data to monitor the long term evolution of instruments and to produce data products. These data products will result from pipeline processing using the VLT/VLTI Data Flow System. Data products will consist of data with the instrumental signature removed as well as data calibrated into physical units. The accuracy of the instrumentation and physical unit calibration will be monitored and maintained by ESO.

ESO data products, raw data and calibration data will be distributed to the programme PI in electronic form through the VLT/VLTI Science Archive Facility at ESO Garching. These data will be available in a FITS format appropriate to several generally used data analysis systems (e.g., MIDAS, IRAF and IDL).

In order to allow the ESO community to reproduce and modify the output of instrument calibration pipelines, ESO will make the pipeline reduction recipes and code available to the ESO community for all supported instrument modes. Over time, the number of supported modes for each instrument will be increased to ensure that the most actively used modes have calibrated data products available.

The accuracy of ESO pipelines should be such to satisfy a major fraction of the scientific needs of the users and ESO will attempt to increase their accuracy over time following the guidance of its community and in-house scientists. ESO will additionally encourage its community to develop and support systems for the generation of advanced data products for ESO instruments and their analysis.

The VLT/VLTI Data Flow to the ESO community and data analysis inquiries will be supported through the Data Flow Group within the Data Management and Operations Division.

## 7. Data Rights

Successful proposers will have exclusive access to their scientific data for the duration of a proprietary period. Normally this period will expire one year after the data have been made available to the PI in a form, which is suitable for scientific analysis. An extension of this proprietary period may be granted in special cases only. The corresponding requests will have to be submitted to the Director General of ESO. At the end of the proprietary period the data will be placed in the public ESO VLT/VLTI archive, along with the abstract of the original proposal that has generated them.

All other data (i.e. observing logs, technical and calibration data) are public immediately after the observations. All data resulting from Public Surveys are also made public immediately after the observations.

## 8. Publications

Publications based on observations collected at the Paranal observatory, or extracted from the ESO Science Archive Facility, should mention in a footnote on the first page *'Based on observations collected at the European Southern Observatory, Paranal, Chile'* including the corresponding observing proposal (or archive hyperlink) which should clearly be identified by its ESO reference number.

## 9. Monitoring of VLT/VLTI Time Use

The Director General will monitor the distribution of VLT/VLTI observing time. Statistics will be provided to ESO Council for every observing semester, showing the distribution of VLT/VLTI time among the ESO member states, ESO and ESA, the Republic of Chile, and other countries. The amount of Technical Time used for commissioning, maintenance, up-grades and tests of telescopes and associated instrumentation will also be indicated.



APPENDIX 1  
PROCEDURES FOR ESO PUBLIC SURVEYS

A Public Survey is understood to be an observing programme in which the investigators commit to produce and make publicly available, within a defined time, a fully reduced and scientifically usable data set that is likely to be of general use to a broader community of astronomers. The practical implementation of Public Imaging Surveys will proceed as follows.

1. ESO will periodically issue a “Call for Public Imaging Survey Proposals”, for groups in the community to propose Public Imaging Surveys. Proposals shall include a scientific rationale, observing strategy, estimated observing time, and its distribution over observing Periods, as well as a detailed description of the responsibilities the team would be ready to take in case of approval of the proposed survey.

2. ESO will ask INAF (for the VST Consortium) and the OmegaCam Consortium to provide detailed descriptions for the observing programmes they intend to conduct in their guaranteed time (GTO) at the VST over the first 4 semesters. A similar procedure will be repeated every two years until the completion of the GTO time.

3. ESO will establish a Public Survey Panel (PSP) including scientists expert in a broad range of current astronomical research, with particular emphasis on those areas that can profit from Public Surveys. The PSP prime mandate will be to review the Public Survey Proposals and, taking into account the GTO programmes, elaborate a scientifically and observationally well coordinated set of Public Surveys. This process may well imply merging different proposals, or expanding their aims beyond the original ones e.g., in the filter set, depth, area, coordinates, etc. In order to achieve these goals the PSP will involve representatives from both the GTO teams and selected teams having submitted Survey Proposals. On the basis of the achieved coordination the selected survey teams will modify the survey proposals, describing the scientific rationale, observational strategy, and data product specifications (e.g. photometric and astrometric accuracy, images, catalogs, delivery time, etc.) as agreed in the course of these activities.

4. The PSP will review these modified proposals and forward them to the OPC along with a document illustrating the criteria adopted for the optimization and coordination of the recommended set of surveys, and the motivations for having rejected others.

5. These resulting proposals for Public Survey may include proposals for subsequent proprietary observations with other ESO facilities which are designed to exploit the results of the survey in question. The OPC will then provide simultaneous recommendations on the time to allocate both to the survey and to its followup. A Management Plan for each survey will also be attached to the proposal for ESO review.

6. For each approved Public Survey ESO will negotiate with the PI the extent of ESO support that could be given, and the timeline of product delivery. The allocation of observing time for the scientific follow up of the survey will be subject to the timely delivery of the survey products and their compliance to the specifications.

7. The PSP Document, the final proposals for Public Surveys and the description of the GTO

programmes will be made available on the web prior to the regular Call for Proposals for the VST.

8. Proposals for Proprietary Surveys can be submitted as usual following the regular Calls for Proposals, thus ensuring that the OPC evaluates all survey proposals (public and proprietary).

9. The ESO/STECF Science Archive Facility (SAF) will be the collection point for the survey products and the primary point of publication/availability of these products to the ESO community. ESO will assist the survey teams to define and package their data products in a manner consistent with SAF and Virtual Observatory standards and will integrate the products into the SAF.

10. Survey programs that directly complement other public surveys should themselves be carried out as Public Surveys. In case of GTO programs in this category, ESO will encourage the GTO Teams making their survey products public and to submit proposals for the scientific follow up at other ESO telescopes, following the same procedures outlined in item 5 above. In all cases the allocation of the OPC recommended observing time for the scientific follow up will be subject to the timely delivery of the survey products and their compliance to the specifications.

11. The PSP will periodically review the progress of the surveys and will assess the compliance to the specification of the survey products. The PSP will then forward to ESO Directorate its recommendations concerning the continuation of each survey and the allocation of the associated follow-up time at other facilities.

## APPENDIX 2

### POLICY FOR GUARANTEED TIME OBSERVATIONS (GTO)

#### A) GT Observations during regular instrument operations

Rewarding Consortia for providing hardware or software that enhance the ESO scientific capabilities and competitiveness is central to the VLT/VLTI strategy. It allows to involve resources and expertises that are spread across the community and to focus them on projects which are beneficial for the whole community.

In any given Observing Period GTO observations will not exceed 10% of the global VLT/VLTI time.

At least two months prior to the issue of a Call for Proposals the GTO PI will submit to ESO the complete GTO plan and will indicate specifically which part is proposed for the semester which is the subject of the Call. After review by the ESO Directorate and approval by the Director General, at the time of the Call for Proposals the GTO plan for the semester will be made publicly accessible via the ESO Web site to avoid the submission of other proposals that would duplicate GT observations. Protection against duplications will be enforced only on a semester-by-semester basis. In the case of GTO surveys or focused projects taking a large fraction of the GTO time, i.e. Large GTO Programmes, the whole observing plan may be made public at once, while the GTO teams will be invited to make public the resulting science products as early as possible.

In their proposal, the GTO Teams will provide the specific list of targets, or the field coordinates and size to be explored. In both cases instrument set ups and integration times will be specified. The total observing time for all targets shall strictly match the GTO time allocated in the given Period.

Like for any other observation, GT Observations are protected against duplications. OPC will reject proposals that will clearly duplicate GT Observations. However, GT observers do not have exclusive rights over the targets they intend to observe or over the science they intend to investigate. OPC can recommend observations of the same targets with different instrument set-ups or of different targets of the same nature proposed by non-GTO scientists.

GT observations are restricted to the use of instrument modes which have been or will be offered to the community.

The GTO Teams are subject to the same regulations of non-GTO Teams concerning the changes of observations with respect to the DG approved plan.

#### B) GT Observations prior to an instrument being offered for general use

ESO policy is to allow and facilitate the scientific exploitation of a new VLT/VLTI instrument as early as possible, provided this is compatible with the activities necessary to bring the instrument to full efficiency and stable operability.

Within this framework, GTO Teams may request to advance part of their GT observations to prior to the instrument being offered to the general users. The Team will not be entitled to bad weather or instrument failure compensations. Only possible losses due to failures of VLT/VLTI telescopes or instrument components provided by ESO can be compensated. The plan for such observations will be timely posted on the ESO Web site.