EUROPEAN ORGANISATION FOR ASTRONOMICAL RESEARCH IN THE SOUTHERN HEMISPHERE

FOR INFORMATION

SCIENTIFIC TECHNICAL COMMITTEE

73rd (extraordinary) Meeting
ESO, Garching, 15 and 16 June, 2010
SCIENTIFIC TECHNICAL COMMITTEE
73rd Meeting
Joint extraordinary meeting with ESE
ESO, Garching, 15-16 June, 2010

Report and Recommendations from the 73rd STC Meeting

STC Members
By Videoconference: L. Bronfman.
By Phone: M. Prouza (in part).

ESE Members (not already STC members):
Excused: M. Franx.

Summary of recommendations
1. First light instruments
   STC supports the choice of ELT-IFU (HARMONI-like) and ELT-CAM (MICADO-like) and their associated AO modules as first light instruments.
   - Revision on both instruments is needed before advancing to the next phase.
   - R&D activities for securing the necessary AO modules are necessary.

2. Additional instrument capabilities
   a. A pool of instrument capabilities rather than generations of instruments should be considered out of which an appropriate sequence of instruments should be derived. At present, this pool should contain all instrument capabilities studied including high-resolution near infrared spectroscopy.
   b. A third instrument not as dependent on advanced AO should follow quickly the two first-light instruments. At the present time an ELT-MIR (METIS-like) would appear as a serious contender for this position.
   c. Instrument capabilities such as a high contrast planet imager and MOS should have priority once their technical feasibility has been properly demonstrated.

3. Procurement
   Open, competitive calls lead to the best possible instrumentation. In special cases where a fair and open competition is difficult, ESO should use its best judgement to define an appropriate procedure. STC should remain involved in this process.

Way of working
An extraordinary STC meeting lasting one and a half days was organized on June 15-16 2010 with the main task to discuss thoroughly and comment on the E-ELT instrumentation plan. This meeting was carried out jointly with ESE until the final closed session. Some time was devoted to the presentation and discussion of the telescope itself, but the emphasis was clearly set on the instrumentation plan. Each participant signed a confidentiality agreement before receiving the relevant documentation.

Conflicts of interest were a major concern early on. In order to mitigate them as much as possible, each participant was asked in advance and in writing to provide her/his conflicts of interest, both personal and institutional, for each instrument. The resulting conflict of interest matrix (see Appendix 2) was checked by ESO and handed out at the beginning of the meeting to all participants.

Finally, it is worth pointing out that no voting took place. A consensus (with one exception for 2b) could be reached for the recommendations issued.
The E-ELT instrumentation plan

STC was very pleased to see the large amount of high quality work carried out by the instrument consortia as well as by the thoroughness of the review board reports. STC would also like to express its thanks to ESO for having made the substantial documentation relative to both the telescope proposal and the instrument plan available early enough to allow for a thorough assessment. Finally, STC appreciated having been presented the reasoning of SWG and ESO that lead to the instrument plan presented.

In STC’s opinion, the E-ELT instruments must be commensurate with and well matched to the ambitions declared by ESO, namely the desire to develop a 42m E-ELT. The challenge is to put together an instrumentation plan bold enough to fully exploit the unique capabilities of the telescope early on, while at the same time basing this plan on reasonable extrapolations of present day knowledge and technologies.

STC believes that the plan submitted goes a long way in this direction and contains almost all essential capabilities required to meet the declared science goals. The following comments and recommendations are aimed at optimizing this plan.

• First-light instruments
  The STC discussed in-depth the selection of a HARMONI-like (ELT-IFU) and a MICADO-like (ELT-CAM) instrument and their associated AO modules as first-light instruments. Clearly, the combination of a spectrograph and an imager is seen as an attractive option, which will allow European astronomers to address a significant number of the major and unique E-ELT science cases early on. While supporting fully this option, the STC makes the following statements:
  o Both instruments will need revision before they can proceed to the next phase.
  o Both instruments rely on advanced AO systems to deliver their full scientific potential.
  During the in-depth discussion, STC was reassured that such systems, while complex and still requiring some R&D activities, would in all likelihood be available and functional by the time of first light. Hence, STC believes that using the first-light instruments as drivers for appropriate AO systems is an excellent way to maximize science return early on. It recommends to ESO to ensure that the required R&D activities be carried out appropriately and in phase with telescope and instrument development.

• Additional instrument capabilities
  The STC also discussed the set of additional instrument capabilities beyond the first-light instruments. It noted that flexibility in this area was essential for several reasons: 1) the rapid evolution in some of the top science areas as well as in the key technologies 2) the potential interest of new member states in either adding to or participating in the building of a new instrument and 3) the necessity in a number of cases to wait for the results of precursor instruments to finalize design. Therefore, any early choice would not only be premature, but also probably carries with it the potential for lost or missed capabilities.

Based on these considerations, STC recommends that ESO depart from the traditional instrument “generation” concept, instead moving towards a pool of instrument capabilities that are studied and sequenced or down-selected at the appropriate time (the first time being roughly a year after the beginning of construction), based on their expected science return, technical feasibility, and the evolution of the E-ELT.
The content of the pool will necessarily be time dependent. At the present time, STC believes that it should contain all instruments capabilities not selected for first light including the capability for high-resolution near-infrared spectroscopy which was not selected for a first generation instrument capability in the plan presented to STC (E-PLA-ESO-508-XXXX Issue 0.5), but which is required to address, among other topics, the characterization of exoplanet atmospheres, one of the E-ELT’s top science cases.

Regarding the phasing of the implementation of these new capabilities, the STC would like to recommend the following guidelines:

- For the third instrument, STC recommends an instrument, which does not rely as heavily on AO to reach its full potential and which could follow quickly the two first-light instruments. At present, based on both scientific and technical considerations, a METIS-like instrument (ELT-MIR) would appear to be a very strong contender for this position.
- Instrument capabilities such as those delivered by a high contrast planet imager or by MOS are seen as key for the E-ELT to reach its expected unique science goals. They should be considered as priorities once their technical feasibility has been properly demonstrated.

- **Way forward and procurement**

  The STC discussed STC-471, relating to procurement of the E-ELT instruments. STC believes that competitive, open calls lead to the best possible instrumentation, offering the whole community the chance to participate in the success of the E-ELT. STC does, however, recognize that in some instances, like the procurement of first light instruments, a fair and open competition might be difficult to achieve. STC trust that ESO will use its best judgment to find an appropriate way forward, taking into account the relatively healthy timeline of E-ELT’s instrumentation programme and the well-being of technical institutes across Europe.

  Whichever way forward is chosen, STC should remain involved in the process. Throughout the years, a good working relation between ESO and STC has proven itself as the best way to ensure a high quality instrument programme while at the same time involving the community in the important choices being made.

**Appendices**

1. STC 73rd Meeting Agenda  
2. STC Conflict of interest matrix  
3. ESE Conflict of interest matrix
### Appendix 1: STC 73rd Meeting Agenda

#### June 15

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<td>1. Opening of meeting/ Adoption of the Agenda</td>
<td>STC-470</td>
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<td>09:10</td>
<td>2. Approval of the Minutes of the 72nd STC Meeting</td>
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<td>09:20</td>
<td>3. E-ELT telescope design status (R. Gilmozzi, J. Spyromilio)</td>
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<td>10:15</td>
<td>3a. Discussion</td>
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<td>10:45</td>
<td>Coffee break</td>
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<td>11:00</td>
<td>4. Presentation of Draft Instrumentation Plan [M. Casali, I. Hook, M. Kissler-Patig (also available: Update on Telescope and Adaptive Optics), S. Ramsay]</td>
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<tr>
<td>12:30</td>
<td>Lunch</td>
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<td>15:15</td>
<td>Closed session (STC only)</td>
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## STC 160610 Conflicts of interest

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Colin Cunningham* The red cross under P of the instruments ATLAS, EAGLE, EPICS, HARMONI, METIS, OPTIMOS-DIORAMAS and OPTIMOS-EVE indicates that Colin is in charge of UK funding for these instruments.

Isobel Hook* The red cross under P of the instruments CODEX, EAGLE, EPICS, METIS, OPTIMOS-DIORAMAS indicates that Isobel is part of the UK E-ELT Project Office and has therefore interest in all instruments with UK involvement.
She is on the science teams of HARMONI and OPTIMOS-EVE (marked under P of these instruments). UK involvement also exists for HARMONI and OPTIMOS-EVE.

P = Personal conflict
I = Institutional conflict