FOR APPROVAL

SCIENTIFIC TECHNICAL COMMITTEE

73rd (extraordinary) Meeting

ESO, Garching, June 15 & 16, 2010

DRAFT MINUTES
Draft Minutes of the 73rd (extraordinary) meeting of the Scientific Technical Committee held at ESO, Garching, on June 15 & 16, 2010.

The STC convened in the following composition with the STC E-ELT Science and Engineering subcommittee (ESE) participating on June 15 and in open session on June 16:

**Chair:** W. Benz (Switzerland)

**Members:**
- J. Hron (Austria)
- J. Blommaert (Belgium)
- L. Bronfman (Chile) Via Video
- M. Prouza (Czech Republic) Via telecon
- J. Fynbo (Denmark)
- L. Haikala (Finland)
- Y. Mellier (France)
- T. Herbst (Germany)
- A. Marconi (Italy)
- M. de Vos (Netherlands) Only June 16
- J. Afonso (Portugal)
- G. Olofsson (Sweden) Only June 16
- S. Arribas (Spain)
- D. Queloz (Switzerland)
- R. Ivison (United Kingdom)

**Members at Large:**
- E. Sadler (Australia)
- D. Crampton (Canada)
- L. Tacconi (Germany)

**ESE:**
- G. Lemaitre (France)
- G. Rousset (France)
- R. Gredel (Germany)
- R. Gratton (Italy)
- J. Rodriguez (Spain)
- C. Cunningham (United Kingdom)
- I. Hook (United Kingdom)

**Excused:** M. Franx (Netherlands)

**On behalf of the ESO Executive:** T. de Zeeuw (Director General)

- M. Casali F. Comerón
- R. Gilmozzi J. Gonzalez
- N. Hubin A. Kaufer
- F. Kerber M. Kissler-Patig
- B. Leibundgut L. Pasquini
- S. Ramsay J. Spyromilio
- R. Tamai

**Minutes:** B. Venemans
16 JUNE 2010

1. **Opening of the meeting and adoption of the agenda (STC-470)**
The chair W. Benz opened the meeting. The agenda was adopted.

2. **Approval of the minutes of the 72nd STC Meeting (STC-469)**
The minutes were approved without any changes. W. Benz thanked ESO for providing the minutes.

B. Leibundgut requested a minor change regarding the participation of L. Bronfman. This was granted and the minutes of the 72nd STC Meeting were approved.

3. **E-ELT telescope design status (R. Gilmozzi, J. Spyromilio)**
After R. Gilmozzi’s talk, D. Crampton asked about the details of the plan for the first few years after first light. R. Gilmozzi replied that a similar approach to the VLT was planned and that operations would start about one year after first light. Following a question by D. Crampton, R. Gilmozzi stated that instrument commissioning would start when the telescope achieved full performance in GLAO mode with natural guide stars.

3a. **Discussion**
W. Benz started the discussion by asking J. Spyromilio how confident he was that the primary mirror segments would be delivered at a rate of one piece a day. J. Spyromilio answered that he was not, but that the project and the contractors were working on this issue and that significant resources had been dedicated in phase B to address this issue. He went on to describe various possible ways to protect the project against delays. D. Crampton inquired how much contingency there was in the schedule. J. Spyromilio replied that the one year scheduled for the primary mirror integration was the margin for all other units. He explained that the schedule was dictated by putting the telescope in place and the primary mirror into the telescope. Following a question by M. de Vos, J. Spyromilio detailed possible places of margin in the construction schedule. R. Gratton inquired what kinds of contracts were issued. In reply J. Spyromilio explained that standard ESO contracts were used, which included penalties if a delivery was late.

E. Sadler asked about possible ways to descope the project. J. Spyromilio explained that were the primary mirror to be smaller, then everything else would scale, saving costs. He also mentioned that the design of the system was not final but very advanced. Therefore modifications to the size of the telescope did not imply a complete new phase B but rather an incremental study. D. Crampton detailed that for the TMT they found the costs to scale with the diameter of the primary mirror $D^{2.25}$, while the science scales with $D^2$ and $D^4$. J. Spyromilio agreed that these scaling laws roughly applied to the E-ELT. After an inquiry by D. Crampton, J. Spyromilio explained that the only way to save costs of the order of 100 million € required the shrinking of the telescope and the dome.

C. Cunningham started a discussion regarding the trade-off between the telescope and the instrument budget. R. Gilmozzi stressed that the budget for instrumentation would provide for 5 instruments, and
that the operation costs of the facility would include funds for new instruments. J. Spyromilio added that the operations budget for the telescope included funds for instrumentation and therefore the investment in instruments was not limited to that in the construction proposal. R. Gilmozzi stated that it was not conceivable that all 5 instruments would be ready at first light. M. Kissler-Patig emphasized that instruments had to be prioritized not because of money but because there was only one telescope.

L. Tacconi inquired whether descoping the telescope from 42m to 39m would compromise the key science goals of the telescope. M. Kissler-Patig answered that a 42m primary mirror was already near the lower limit for some science cases. As a result a smaller mirror would have an impact on the science cases. W. Benz stated that everything that might jeopardize the major science cases of the telescope would be something to very carefully think about. R. Gratton asked if relaxing the schedule would save costs. J. Spyromilio replied that if, for example, the production of the mirror segments took longer, then it would result in a higher cost.

4. Presentation of Draft Instrumentation Plan (M. Casali, I. Hook, M. Kissler-Patig, S. Ramsay)

After S. Ramsay’s talk, I. Hook asked about the fraction of the time that METIS would be able to operate. S. Ramsay replied that the fraction was around 50%. T. Herbst inquired whether the optical/infrared wide-field spectrograph designs addressed the near-infrared OH lines in the low resolution mode. S. Ramsay answered the DIORAMAS team was confident that good results could be obtained in low resolution. G. Rousset asked what it meant when an instrument operated in seeing limited mode. S. Ramsay replied that it actually meant when GLAO was working at its poorest.

After M. Kissler-Patig’s presentation, D. Crampton asked what zenith distance was assumed and what the maximum zenith distance was for the telescope. M. Kissler-Patig answered that the simulations were done at 30 degrees zenith distance but that the telescope was specified to work up to a zenith distance of 70 degrees. Following a further inquiry by D. Crampton, M. Kissler-Patig mentioned at least one science case that required observations of the LMC with good AO corrections, adding that a closer look was needed to identify which type of AO corrections could be expected at such high zenith distances. T. Herbst asked about the effects of the dome on the seeing. J. Spyromilio noted that for the VLT in cases when the telescope was pointing appropriately into the wind the dome seeing was negligible. The E-ELT dome seeing was under investigation through a number of Computational Fluid Dynamic studies. After a question from D. Queloz, M. Kissler-Patig clarified that the telescope did not work when GLAO did not work and that this was labeled as weather downtime. J. Spyromilio added that as long as the lasers were operational and the telescope able to close the loops, the telescope would operate, even if the coherence time were short. The image quality would be close to the seeing value but the telescope would be functioning.

After I. Hook’s presentation on the discussions in the Science Working Group, D. Queloz wanted to know which first light instrument provided exo-planet imaging capability. I. Hook replied that HARMONI would have a coronagraph. J. Hron asked for clarification regarding the origin of the circum-stellar disks science case. I. Hook explained that the science case was coming from the DRM. T. Herbst inquired whether a visitor focus was a top level requirement for the AO modules. S. Ramsay stated that only a bare Nasmyth focus was foreseen. J. Fynbo noted that the first light instruments HARMONI and MICADO both required good seeing. I. Hook replied that HARMONI could also be used in poor conditions. After an inquiry by J. Fynbo, I. Hook detailed that the lowest wavelength
obtainable with the first light instruments was 0.45μm.

After S. Ramsay’s second presentation, M. de Vos asked whether MAORY could be built faster than indicated by the consortium. S. Ramsay replied that the review panel firmly believed that the module could be shipped at the same time as MICADO. Following an inquiry by G. Rousset, S. Ramsay stated that at that moment the MCAO module would be coupled to a single instrument. D. Queloz wanted to know why there was no post-AO module in the budget for METIS. S. Ramsay explained that the METIS-internal AO system could deliver a large fraction of the METIS science case. The full AO system would be included in the budget for the second generation instruments. D. Crampton asked how confident ESO was that the instruments would be delivered on time. M. Casali answered that the average delay of the second generation VLT instruments was around 1 year.

After M. Casali’s talk, R. Gratton inquired who would carry out any new conceptual design phase. M. Casali replied that this was open for discussion. T. Herbst asked whether possible ways were being explored to keep the consortia together. M. Casali answered that it depended on the procurement policy, but likely it would not be possible. C. Cunningham inquired what the ESO internal FTEs in the budget covered. M. Casali detailed that it provided for preparatory activities, interface and infrastructure development, management of contracts and development of some subsystems. Following a further question by C. Cunningham, M. Casali stated that ESO would fund the R&D phase of the instruments, after consolidating what was really necessary for the first generation. M. de Vos mentioned that proofing of feasibility was part of the instrument development plan and should involve a consortium. M. Casali answered that he would like to involve consortia. After a question by M. de Vos, M. Casali detailed that the interface discussion would take place with all first light instrument teams. He added that requirements for the interface were identified from the phase A studies.

4a. Discussion of Draft Instrumentation Plan (STC-471)

The chair W. Benz opened the discussion by mentioning that having imaging and spectroscopic capabilities at first light was an optimal solution. He continued by asking how reliably ESO could say that MCAO would work close to first light and what MICADO could do without MCAO. M. Casali answered that MCAO was not a high level of risk as shown by the results produced by MAD. N. Hubin added that, although some R&D was needed, a MAORY-like MCAO module could be developed within the time scale set by telescope construction. T. Herbst inquired why the report indicated that MICADO with SCAO was not compelling. S. Ramsay replied that with SCAO MICADO could not deliver a large fraction of the science case. W. Benz noted that “MICADO will require MCAO to perform at the full capability” and “without MCAO the science case is not compelling” were quite different statements. D. Queloz asked what kind of R&D was needed to demonstrate that MCAO would work. N. Hubin replied that the working of MCAO was demonstrated on the VLT with MAD. Laser tomography would be tested with the AOF in 2014. G. Rousset noted that there were large steps to be taken between MAD on the VLT and MCAO on a 42m telescope. He was surprised to see that MCAO could be ready at first light, while the logical advance would be to first develop an LTAO module like ATLAS. R. Gilmozzi disagreed by mentioning that MCAO was the only AO mode that was demonstrated on sky besides SCAO. He added that MCAO on the E-ELT might also work with natural guide stars making the project less dependent on laser developments. D. Crampton commented that Gemini would have MCAO with lasers in a year. W. Benz asked whether it was better to wait for a demonstration that MCAO with lasers worked. Following a question by L. Tacconi, R. Gilmozzi explained that the limiting magnitude of NGS was independent of
telescope size. J. Blommaert wondered whether having both LTAO and MCAO at first light was posing problems. M. Casali replied that there was a possibility that one AO module could feed both first light instruments, but this needed to be further investigated.

I. Hook asked which of the first light instruments had a SCAO module as backup. S. Ramsay explained that a possibility was that HARMONI initially would start with GLAO. M. Casali pointed out that this was one of the key items to investigate during the specification revision task. W. Benz inquired how substantial the rework of the opto-mechanical design of HARMONI would be required and whether the time needed for this posed a problem for first light. S. Ramsay ensured that the rework was no problem for HARMONI being a first light instrument, as the sort of changes were similar to going from a conceptual design to a preliminary design. W. Benz stressed that a new call should be issued for HARMONI given the substantial modifications. M. Casali agreed that this was a likely scenario and noted that there was enough time even for a completely new Phase A study. D. Queloz inquired whether all instrument designs needed to go back to a call level. M. Casali explained that it depended on whether the revision completely changed the architecture.

After an inquiry by W. Benz, M. Casali explained that the first light instruments had to be chosen soon. He added that while the time scales were comfortable, there was no desire to delay. R. Gilmozzi added that the proposal for construction needed to have the instruments of first light clearly defined, which was asked by ESO Council. He added that, in addition, the construction proposal should contain a demonstration that the combination of the telescope with instruments could deliver the science goals. Following a question by D. Queloz, M. Casali noted that the construction proposal would not include all the instrument revisions. He agreed with M. de Vos that the instrument redefinitions were considered as deltas on the Phase A studies. T. Herbst asked whether the STC would see the instrument specifications again before contracts were signed with the instrument builders, which M. Casali confirmed.

The chair W. Benz moved the discussion to the first generation of instruments. He pointed out that with the disappearance of SIMPLE no high resolution NIR spectroscopy capability would be available at the E-ELT. I. Hook agreed, but added that the discussion should focus on relative priorities. D. Queloz inquired why CODEX needed to be at the Coudé focus and whether the visual and NIR high resolution capabilities could be mixed. L. Pasquini explained that CODEX needed the Coudé focus because of the quiet environment. A substantial change in design would be needed if the instrument had to be placed at another focus. He added that he strongly objected to a NIR arm for CODEX because of coatings and preferred two separate instruments for the visual and NIR. T. Herbst noted that the capability provided by SIMPLE had a high complementarity with JWST. S. Ramsay mentioned that SIMPLE was not just an infrared CODEX, as SIMPLE was an AO-fed spectrograph. W. Benz asked whether a SIMPLE-type capability would disappear from the E-ELT. S. Ramsay explained that SIMPLE could be a second generation instrument. Following a remark by M. de Vos, M. Casali stressed that the first generation of instruments would be chosen to fit within the available budget. I. Hook asked whether the first generation instruments would be specifically defined in the proposal, or whether there would be a section about how the selection would be done. M. Casali imagined the latter to be the case and mentioned that the instrument plan was to be reviewed again in the future.
The chair moved the discussion onto the procurement process. M. Casali explained that there was no intention to prevent competition. He stated that the baseline was to go for an open call when genuine competition was possible. He added that even when it were decided to continue with an established consortium, an agreement had to be reached with the consortium regarding for example possible descopes and the structure of the consortium. If such an agreement could not be reached, an open call would be issued. He continued by raising the question who would compete with an established consortium, if the instrument had not changed much from the Phase A study. W. Benz remarked that it was fundamental that the community decided to compete or not. R. Ivison noted the contradiction between having enough time to develop the instruments and the apparent need to move forward rapidly. S. Ramsay explained that in some cases the project had to move forward rapidly due to the need to keep the established consortium together, but only if it had been decided that the instrument would be procured in this way. Following a question by W. Benz, M. Casali detailed that some of the consortia formed quickly and it was not guaranteed that they were structured sensibly.

W. Benz expressed mixed feelings and feared a bad reputation if the competition were not fair. D. Crampton mentioned that competition worked very well. He argued that for the first light instrument ESO should decide how to procure as time was relatively short, but after the first two instruments the community should be able to decide whether to compete with existing consortia. W. Benz agreed as long as the competition was fair. M. de Vos argued that it might be considered unfair if an open call were issued when a full Phase A study had been completed. He continued that in normal procurement situations there was a range of options from which to choose, from a fully open call to an invitation to a single party. He noted that as ESO was responsible for the quality of the instruments, it was a strong argument not to go for a new open call if that meant that the quality could not be guaranteed. R. Gratton questioned what an open call really meant, given that some consortia already fully developed a Phase A.

L. Tacconi asked how many replies there were for each Phase A call. R. Gilmozzi answered that for several Phase A studies there were several responses. D. Crampton noted that in a few years the science would have evolved and changes in the instrument requirements had to be expected. He further stated that it was important to allow new member states to enter the competition. M. de Vos agreed with this, but expressed worry about the time scales. He inquired how R&D could continue while still having a completely open call after that. M. Casali answered that due to the many unknowns it was difficult to make a prediction. He fully agreed with the desire for competition.

D. Queloz expressed surprise regarding the EPICS time scale given the long development time. M. Casali explained that there was a mistake in the EPICS time line. D. Queloz inquired how the R&D for an EPICS-type instrument would fit into the whole instrumentation plan and whether it would be funded by ESO. S. Ramsay explained that small directed R&D studies would be put into the instrument programme. D. Queloz wanted to know how these activities were integrated into the overall instrumentation plan. M. Casali replied that an R&D plan needed to be developed in due time.

The chair closed the open session.