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Board Response to SALT External Review

The SALT board appreciates the time and effort of the external review. The report is fair and contains a number of important recommendations that will strengthen the operation and governance of SALT. To ensure that these recommendations are acted upon, the SALT board has formed a subcommittee that is tasked with tracking the implementation of the recommendations. This subcommittee will report to the board every six months describing the progress that has been made in implementing the recommendations of the external review. Below are the board's detailed responses to each of the external review committee's recommendations.

Recommendation 1: the SALT Board should explore ways to consolidate the partnership. Possible ways towards this goal include: explore whether existing partners are willing to increase their share, ideally at the 10% level or more; and encourage the smaller partners to participate as a consortium with a predefined minimum share (10% or more).

The board broadly agrees that it would be useful to have existing partners increase their shareholders; however in practice most partners are unable to secure the funding required to increase their shareholdings. There is disagreement within the board on the usefulness of a predetermined minimum shareholding of 10% or more for the current partners. While this would lead to a smaller and perhaps more focused governance structure, the smaller partners bring a range of expertise to SALT and the board, and have been some of the most scientifically productive partners in SALT. As a result, the SALT board will encourage current partners to increase their shareholders, but will not explore merging the smaller partners into a consortium.

Recommendation 2: The SALT Strategic plan must be a priority for the observatory and a main focus for the current and future SAAO Director. The Review Committee recommends that the SUG and the Board, in consultation with the SAAO Director and the Observatory staff, draft a detailed schedule that will lead to a selection of one of the available options and begin implementation no later than Nov. 2018 to maximize synergy with current and future facilities. The first step in this schedule is the delivery, in Nov. 2016, of the SUG report on feasibility studies priorities.

SALT will continue to develop its strategic plan with the view to concluding this exercise as soon as possible. The process started with the South African SALT staff, and this group will continue to be the major contributor to the plan as it develops in the future. To be successful, however, all partners must contribute to the plan and both endorse and commit to it. The process must move forward with deliberate speed; note that the SALT Users Group (SUG) has surveyed the SALT user community on their preferences for future development. Substantial new financial resources would be needed to implement the chosen strategy. Options A, B, C and D of the draft Strategic Plan will need to be considered very carefully to ensure the future sustainability of the telescope and to ensure full support across the SALT partnership. This would require a new commitment from all partners, and ideally a major new partner (>10%).

It is expected that the SALT strategic plan will align itself naturally with the South African National Strategy for Multiwavelength Astronomy. This includes in its core goals commitment to the main astronomical facilities of the country (MeerKAT/SKA and SALT, and their associated synergies) in the coming decade, and a focus on research excellence, human capital development, and transformation. An essential step is to continue optimization of the observatory to LSST-cadence time-domain studies.

The SALT board reviewed the strategic plan at the June 2017 board meeting, and is targeting to adopt the plan at the November 2017 board meeting. The strategic plan is a living document, and it is anticipated that by November 2017, that there will still be a number of options being considered in the 10 year plan. The final selection of which option SALT will pursue in the 10 year timeframe will be taken by November 2018.

Recommendation 3: the SALT Board must explore ways to replenish the Development Fund with regular contributions. The fund should be used to realize SALT's Strategic Vision and augment the telescope capabilities, including, but not limited to, procuring a new instrument. The Fund could be sustained through contributions (including in-kind contributions) from the existing partners, increasing the share of existing partners, and recruiting new partners.

The board agrees that a development fund is critical to maintaining SALT as a world class observatory. However, in the current fiscal environment, we cannot count on each partner to increase its contribution to sustain a development fund. The current development fund will be closed at the end of July, 2017. Current partners have agreed that their shareholdings may be diluted to attract a significant new partner, and the board will continue to explore alternative methods of obtaining funds for the development of SALT.

Recommendation 4: SALT's strategic vision must be leveraged in attracting new partners. As one of many possible examples, institutions in the LSST consortium would certainly be far more interested in a SALT partnership if their contribution were used to enable SALT to follow-up LSST transients. Conversely, SALT could be leveraged to gain LSST access to the communities (the South African community in particular) that are not currently part of the LSST consortium.

The board strongly agrees that new partners are needed, and will continue its active efforts to identify new partners. This includes advertising the potential synergy with LSST to the astronomical community. We note that the NRF has funded some South African participation in the LSST. There is also synergy with MeerKAT, and eventually SKA, and this will be explored by the board. Finally, there is potential synergy with TESS, a NASA satellite scheduled to be launched in March 2018, and SALT is investigating investments from the TESS project.

Recommendation 5: As the search for a new SAAO director is carried out, it is highly desirable to select candidates with the expertise, knowledge and desire to take on a strong leadership for SALT as an international scientific organization. A deputy director with extensive SALT knowledge could be selected to assist the new Director if necessary. However, in the view of this committee, it would not be advisable to entirely separate the SALT and SAAO leaderships.

The board strongly agrees that a new SAAO director needs to provide strong leadership for SALT. However, the NRF is responsible for the selection of the new SAAO director. The NRF is confident that the Director Designate for SAAO will take on a strong leadership role in SALT

as an international observatory. The NRF will ensure that the SAAO Executive Committee will be structured in a manner that will continue to enhance the integrated observatory approach. A strategic planning exercise for SAAO will be conducted, and the SAAO Science Advisory Committee and SALT, as a major stakeholder, will be consulted.

The board was delighted to be informed that Petri Vaisanen, current head of SALT astronomy operations, has been appointed as the next director of the SAAO. He clearly fulfills the expectation that the new SAAO director will be able to provide strong leadership to SALT and the SALT board strongly endorses Petri's selection as the next SAAO director.

Recommendation 6: The Board should establish a permanent Science and Technical Committee, or evolve the SUG, with clear terms of reference covering assessment of present facilities and of possible future developments, and of topics relevant for operations and data reduction.

The board agrees with this recommendation. The SALT board must ensure that the committee is both empowered and accountable. The board will create a permanent Scientific and Technical Committee (STC) which advises the board and SAAO Director on policy and technical matters related to the planning and operating of SALT. The STC will also advise the board on scientific priorities for new instruments, projects and upgrades to SALT. This committee will be well placed to help the partners to transition from a user to a owner mindset, as the review has strongly recommended. The board has tasked a subcommittee to draw up terms of reference for the STC, and it anticipated that the STC will be established at the November 2017 board meeting.

Recommendation 7: The Board should consider the possibility of having some open time for the international community, and Key projects decided at the level of the Corporation as a whole. To facilitate time allocation, the Board could discuss handling the open time as well as Key Programs through a common TAC. In the future, such a TAC could evolve to review all proposals.

There is little support for a common TAC which will be problematic for many partners since this could bypass the individual needs of the various partners (for example, South Africa gives priority to student proposals, which might not fare as well with a common TAC). The existing arrangements work well, and have allowed for the development of large projects.

Instead of providing general open time for the international community, the board believes that it is better to encourage collaborations between SALT partners and the general international community. Indeed, one of the driving forces behind setting up the SALT partnership was to encourage collaborations between South African astronomers and the international community. Each institution should be allowed to make its SALT time open to the international community and each partner should manage its own share of observing time through its own TAC. South Africa has opened part of its time to internationally-led proposals if these involve SA astronomers.

The SALT Board will consider expanding the amount of DDT time available and advertise this better to the international community.

Key projects are desirable but must arise organically and should be linked with the particular strengths of the telescope; this means getting the SALT community together more frequently to discuss scientific initiatives.

Recommendation 8: SALT, through the Operations Manager and the designated Safety coordinator, should strengthen its safety program by getting advice and guidance from a professional safety engineer, possibly by establishing a relationship with another NRF facility (such as iThemba LABS).

The board agrees, and notes that SALT has already had an external safety audit and issues of safety are taken extremely seriously. There is a safety committee for the Cape Town Observatory and for the Sutherland site that addresses the requirements of the OHS Act. Closer cooperation with iThemba Labs in the context of safety will be explored. The SALT board notes that SAAO operates SALT and is responsible for its safety program.

Recommendation 9: SALT and SAAO should further strengthen coordination of safety programs, including joint safety exercises and external audits.

The SALT board agrees, and notes that in the integrated Observatory model, there should be a single safety committee for the Sutherland site that oversees SALT, as well as the other South African and international telescopes. Safety initiatives in place at SALT (such as smoke detectors, fire alarms, fire drills and evacuation plans) need to be expanded to encompass the entire site. Likewise, personal safety measures in place for observers on the small telescopes could easily be incorporated at SALT. SALT staff also provide advice and oversight for SAAO technical staff that have undergone the necessary training, but who lack experience in working at heights and using personal safety equipment such as fall-arrest gear.

Recommendation 10: The asset renewal fund should not only be restored, but plans to continue to grow this critical fund should be developed, alongside the ongoing operations levy and the development fund, in order to address obsolescence and prevent eventual failures and loss of reliability.

The board agrees and instructed staff to develop a detailed asset renewal strategy. This asset renewal strategy used best estimates for the lifetimes of various telescope subsystems along with an assessment of their replacement cost to develop an informed projection of the cost to maintain SALT as an robust, efficient telescope for the next 30 years. The asset renewal document has been finalized, and going forward the board will use this document to determine the annual operations levy, which will include a ring-fenced asset renewal budget to ensure that sufficient funds are available to replace aging systems and to maintain the telescope.

Recommendation 11: The lack of a broadly available HRS pipeline is limiting the productivity of that instrument. Release of a fully functional HRS pipeline for general use (perhaps starting with local SAAO and SALT partners) should be a high priority.

The board agrees, and a pipeline for HRS data has been a high priority on the SALT project list. The HRS pipeline was developed by the SALT Astronomers and was released to the community in January 2017. The pipeline routinely handles data in the HR, MR and LR modes is now being refined through iterative exchanges between the astronomy operations team and experienced HRS users that are willing to contribute their échelle data reduction expertise. The next step is to develop a pipeline tool for the High Stability (HS) mode of HRS. Expertise in HS HRS data

reduction does not exist among the current astronomy operations team, nor in the SALT partnership, and various options are being explored to develop an HS pipeline.

Recommendation 12: We recommend the SALT project consider a default proprietary period of a maximum of 1.5-2 years. Key projects could have significantly shorter proprietary times. A recommended statement of acknowledgement of the use of SALT archival data should be prominently featured on the SALT data access website.

There is support within the board for developing a proprietary period policy, but there are concerns that a single proprietary period may not be appropriate, for example student theses and long term projects may require longer proprietary periods. The board will task the STC with developing a proprietary period policy.

Recommendation 13: We suggest the following enhancements to the VO data archive: provide data quality information to allow users to filter out poor quality observations, provide quick-look products (images of provisionally calibrated data) that can be inspected by the archive user in the browser, explicitly associate observations and the calibration files necessary to create science-ready products so any further reductions required can be made by the user, making provisionally science-ready products available. (The latter step will minimize the necessity of providing a full suite of associated calibration files.)

Although the board agrees in principal with this recommendation, additional human resources are needed to develop such an archive. Priority for resources needs to be given to the current operation of the telescope and data pipeline. Once the telescope operations and data pipelines have matured, the board will direct resources to enhancing the VO data archive. It is anticipated that a VO compatible data archive will be ready in July 2019.

Recommendation 14: We recommend that the SALT operations team investigates the feasibility of relaxing the humidity limits of SALT science operations and thus identify the gains that can be made to reduce weather down time.

The SALT technical operations staff is assessing this issue. Appropriate sensors have been installed on the telescope and these are collecting data. This has already led to some relaxation on the humidity limits. The statistical data is still being collected and by August 2017, data collection should be complete and a new humidity limit policy will be finalized and put in place.

Recommendation 15: Given the importance of scientific software for the scientific productivity of SALT, we identify the need for a dedicated software engineering expert for SALT science pipelines and science support software.

The board agrees in principle with this and will revisit its 2003 decision not to fund science pipeline development. It is the expectation of the board that a new software expert will be hired in 2017 or 2018.

Recommendation 16: We recommend that students should be provided with opportunities to acquire hands-on experience at the SALT telescope.

The board agrees, and some students have already had experience observing with the SALT Astronomers at night. This can be particularly helpful for students who are using SALT data in their research projects or preparing SALT proposals. SALT will invite PIs to send students to

the telescope for short visits when their targets are visible. All transportation costs would need to be funded by the student's advisor. The SALT Board will investigate establishing a limited number of student fellowships for those who need funds for accommodation in Sutherland.

Recommendation 17: We recommend that a strategic plan for Human Capital Development (HCD) and Transformation be developed.

This needs to be viewed in the broad SALT partnership perspective. Each partner will have their own individual HCD needs and challenges, and the plan would need to address all of these.

Given South Africa's unique needs and experience, South Africa can take the lead on this initiative, since HCD is already extremely important in the National Strategy for Multiwavelength Astronomy of South Africa. The NRF can better utilize the enormous intellectual potential that is provided by the entire international SALT partnership to drive its own transformation agenda. The NRF has recently committed to funding South African black PhD student and postdoctoral placements at SALT partners.

Recommendation 18: We recommend that SALT improves tracking and accounting of students from SALT partner institutions and the SA community; possibly creating a network of SALT students to encourage cross-institutional collaboration.

The board agrees, and will develop a policy for tracking and accounting of students from SALT partner institutions. PhD thesis information is currently collected as part of the time allocation system, and this data will be put into SALT's annual report.

Recommendation 19: We recommend that the concept of a student exchange programme be revisited and discussed, building on Stobie-SALT experience.

The previous program was only really successful with UK universities, due to the similarities between their higher educational system and South Africa's. However, changes to the UK funding model for foreign students has made it very difficult to continue the Stobie-SALT fellowships. Some of the US and UK partners have been discussing shorter-term exchange visits and co-supervision of PhD students as a viable alternative. Given global financial constraints, much of the funding originally committed to this program has been discontinued and will need to be re-established on both sides. The SAAO manages a small grant for South African-USA SALT exchange, and co-operation with SALT is included in all South African astronomy bilateral agreements. These programs rely on the existence of collaborative science with South African colleagues, and will be helped by giving the international partners more exposure to the university community in South Africa.

The NRF is instituting an international postdoctoral programme to advance its transformation agenda for Astronomy, which will benefit SALT. Recently graduated black PhD students will be prioritized for post-doctoral placements at international SALT partners. The emphasis will be on development, not only in the context of publication outputs, but also in the context of scientific leadership.

Recommendation 20: We recommend that the visibility of SALT be reinforced worldwide, particularly in Southern Africa, through a stronger EPO programme, in close coordination with SAAO. Each partner should contribute to such an active EPO program through the overhead costs and/or through in-kind contributions (outside SALT budget). Additionally, SALT should partner with other organizations, such as

MeerKAT/SKA and the South African Institute of Physics, with established EPO programs. All activities and contributions should be recorded. The resources invested in this effort should possibly be overseen by the CFO.

The board agrees that SALT needs to strengthen its global visibility. EPO is already happening at many levels, with some partners having contributed in this way from the beginning, e.g. Rutgers astronomers do EPO locally in New Jersey, and SALT is part of these efforts. AMNH is providing its digital space shows free of charge to all digital planetariums in South Africa. All the partners should feature SALT in their EPO activities. The partners can and should share EPO materials and ideas that they develop for their local audiences. The great strength of AMNH in this area is an outstanding resource that can be tapped by all.

SALT needs better exposure at professional meetings such as the AAS, IAU, etc. and the board has committed to having SALT booths at the Texas Relativistic Astrophysics meeting in Cape Town (Dec. 2017) and at the Jan. 2018 AAS meeting. The board will continue to support SALT booths at major meetings; a common display with the SKA will be beneficial and discussed with the SKA.

The NRF is engaging South African corporate leaders to explore ways private industry can get involved in developing the town of Sutherland and in supporting SALT.