

SALT OPERATIONS

18 September 2015

Version 1.0

SALT PRIORITY REVIEW

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1. PURPOSE OF THIS DOCUMENT WITH A HISTORY OF LAST 18 MONTHS

Before considering a revision of SALT priorities, below is a table of issues drafted in the "shooting team-building" in April 2014 in Sutherland, for a historical refresher and record. The status column shows the situation in March 2015 indicating progress in several issues.

The table comes from a document (Priority Project Review-v3.0.doc) that Darragh put together for that March 2015 meeting. It discusses the issues in more detail and breaks them down to "*the Problem*", "*the Way Forward*", and "*Resources needed*". The actual meeting in March 2015 *prioritized* these issues from the highest priority of P0 to P3, and added some more, resulting in a summary document by Darragh (Outcomes-v4.doc), which was also submitted as part of Board documents.

This present document, then, takes the Priority Project Review doc, re-organizes it on the basis of the Priorities of the Outcomes, and updates all the Sections to reflect the situation and status and current needs of the projects in September 2015, and suggests additional projects.

The goal will be to re-evaluate the priorities of the projects in the team meeting on Sep 28, 2015, so that maximum science efficiency is achieved both in the short and long term without overwhelming the resources.

1.1 Items identified in April 2014 with status updates from March 2015.

Issue	Status
1. No active alignment, unstable PSF • Deep imaging impossible, hurts spectroscopy, science done in non-optimal conds, time spent aligning. • Critical. Cannot do 10-m science.	Edge sensors now on 7 segments, tip/tilt control demonstrated. Global Radius of Curvature control well advanced. New Project Manager appointed. Systems audit completed that lifted out many issues to be addressed. Procurement of full array edge sensors about to begin.
2. RSS throughput • Factor 2 light lost everywhere, factors of many in blue. • Critical. Cannot do 10-m science.	Optical service produced 50 per cent increase in throughput. Plans for further improvement in progress.
3. Telescope (Primary+SAC) throughput • Perhaps 20-30% lower than optimal • Important. Would help the faintest/fastest science.	Discussions on how to measure the SAC begun but otherwise no tangible progress.
4. Lack of rotation guidance, Rho drift • About 2 arcsec at edge of field per hour, better in South. • Important. Cannot do 10-m class MOS.	2 possibilities here: (i) adaptation of successful HRS guider for RSS in serious consideration; (ii) much better rho stage almost complete.

5. RSS straylight • 20-100% extra light on detector, up to 0.4 mag in depth • Important. Hurts 10-m class faint source spectroscopy, wastes time in up to factor of 2 longer exposures.	Indications that straylight is now less then before the fix. TBC. Keith to give status report? And Petri from science data?
6. Difficulty of flat-fielding. • Moving pupil affects not understood well, can't flat-field. • Important. Accurate photometry at <5% (scam,rss,fp) impossible. *Models?? New cal method??*	Not done yet. New ideas from Ken N.
7. Unresponsive fine tracker movements (acquisition). [+ other slow-response buttons on SOMMI and SCAM, e.g. focus] • wasting on average 3 mins per pointing. • important. 2 weeks p.a. lost, + frustration. *Software fix pls?*	Not done yet. RSS guider upgrade will address many of these issues (e.g. focus and fine offsets)
8. Poor performance of calibration unit • uv/blue RSS and full-mode HRS calibs impossible. • important. Some science can't be done, time lost.	New CALSYS relay unit tried out with good results. Some rework required and currently in progress. Should be in full operation by end of April
9. Stability of calibrations forcing night time cals • using avg of 4 min per RSS target. • important. 2.5 weeks p.a. lost. *Tests & new scheme??*	Initial tests for day-time arcs started. But no system planned yet.
10. RSS guide probe efficiency • important. Losing significant flux outside slit. *..the HRS one is better!*	Recognized as *high priority* and plans in progress for adapting the HRS guider to make a new guider for RSS
11. Unstable slitmask magazine mechanics • important. 2-3 breaks p.a., 3-5 RSS nights lost. *??*	Slitmask unit performance seems much better since RSS was taken off for optical service
12. Humidity limit • Difficult. could gain 1-2 months open time if could go to 90% or 95% external RH.	Under investigation?
13. Tech. standby in town • Losing 20 mins per call. This also adds up … Difficulties especially in the beginning of the night	Tech.standby in controlroom for beginning of night under consideration
14. Checklists when returning to nominal instrument (etc.) status, or starting out with new ones. • After changes and fixes. • Regular daily late afternoon.	Done for afternoon handover. Still to be done for following changes and fixes.

15. Accessible lists of nominal temperature limits for various systems (detectors, igloos, etc.) - (to avoid unnecessary callouts)	Not done yet.
16. Better tech.issue logging and tracking system	Fault logging system developed and in use. However, fault tracking and solving system not in use yet.

2. P0 PROJECTS

A listing of the P0 projects as identified in March 2015.

2.1 ACTIVE ALIGNMENT, SAMS (CHRIS, HITESH)

2.1.1. The Problem

- No active alignment, unstable PSF.
- Deep imaging impossible, seriously hurts spectroscopy, science done in non-optimal conditions compromising results, time spent aligning.
- Critical. Cannot do 10-m science.
- Considered a VERY high priority by the SALT Board and SALT Ops.

2.1.2. Progress report since March 2015

[please edit] GRoC issues still present half a year ago are solved. SAMS ran with the central 7 segments for a couple of months succesfully, during which many software issues were ironed out.

2.1.3. The Way Forward

[please edit]

2.1.4. Resources Needed and Amount of Time

[please edit, the following text is from previous version] The industrial and implementation team has increased from 3-4 during research and development phase to no less than 10 people, which will expand with another 3 during the installation phase. Three of them work full time and the rest part time. A responsibility matrix, which spells out roles and responsibilities of each team member was signed and implimented. According to the best information to our disposal the system should be fully implimented by the end of 2015. Further refinements may be required during commissioning.

Issue	People	Cash Required	Time	Responsible Person	Short Project Plan	Priority	Progress
SAMS	Many	Budgeted	June 2016?	Chris		P0	Good progress.

2.2 TRACKER UPGRADE (RAOUL)

2.2.1. The Problem

[please edit if needed]

- Tracker needs strengthening for NIR
- General reliability. Rho-motor.

2.2.2. Progress report since March 2015

Project is approved and budgeted for, on-going. [please add detail if needed]

2.2.3. The Way Forward

[please edit]

2.2.4. Resources Needed and Amount of Time

Issue	People	Cash Required	Time	Responsible Person	Short Project Plan	Priority	Progress
Tracker Upgrade	Many	Budgeted	End 2015?	Raoul		P0	Good progress. Mid-2016?

2.3 RSS GUIDANCE PROBE (JANUS)

2.3.1. The Problem

- The main drawback is low throughput limiting its use to bright guide stars
- No focus control.
- Losing flux outside slit because of poor performance
- The HRS guider is better.
- Slow movement, and not accurate enough to be used for sub-arcsecond offsets and blind pointing.

2.3.2. Progress report since March 2015

Good progress. Project budgeted for in the May Board meeting. User specs provided by AstOps were reviewed, and design specs being drafted. Project now planned and started. Importantly, this includes a 2-probe design to mitigate rotation drift and detectors going deeper than before. Proof-of-concept hardware orders imminent. Current schedule: end of 2016.

2.3.3. The Way Forward

Proof-of-concept hardware will be used to evaluate feasibility of current concept designs and feed into the concept evaluation review. Will require budgeting for Stephen Hulme's time during 2016.

2.3.4. Resources Needed and Amount of Time

See table below.

Issue	People	Cash Required	Time	Responsible Person	Short Project Plan	Priority	Progress
New RSS Guider	JB/SH/Mech/Elec	R3.9 M	By end of 2016	Janus	Evaluate proof-of-concept hardware and concept optical designs. Build a new guider in 2016.	P0	Good progress, project budgeted, planned, and started.

2.4 HRS HANDOVER

2.4.1. The Problem

HRS is not handed over. In addition to the general acceptance of the instrument, i.e. making sure that it can deliver the science it is meant to, there are still a number of smaller issues and to-dos on the operational and calibration side to make it more usable and efficient to use.

2.4.2. Progress report since March 2015

Éric Depagne as the new HRS instrument scientist was tasked to push the HRS ATP through with Martin and Janus and others, and get all the necessary documents ready and delivered to the committee deciding on the acceptance. Committee met and accepted the instrument in Aug/Sep 2015 and the payment has been made to Durham.

2.4.3. The Way Forward

This issue can be taken of the list. Now that we can work on them, more detailed HRS issues will now need to prioritised by themselves.

2.4.4. Resources Needed and Amount of Time

This issue can be taken of the list.

Issue	People	Cash Required	Time	Responsible Person	Short Project Plan	Priority	Progress
HRS Handover	Eric, MW, JB	None		Eric		P0	Done! It is ours.

2.5 HRS PIPELINE (ÉRIC)

2.5.1. The Problem

HRS has been in operation for nearly 2 years now. No science papers have come out yet, and the major reason for this is that PIs do not know what to do with the data they receive.

2.5.2. Progress report since March 2015

It was recognized soon after the discussions in March that new resources would be needed to create a good and reliable pipeline. There are/were some individual efforts going on. AK demonstrated the use of MIDAS. DG and RK are developing an HS mode version. DOD

asked if Paul Butler would want to develop an HS version. The development furthest along is the PySALT version by Steve C., which reduces LR/MR/HR - however it can still be used only by the developer and has not been independently tested. Furthermore, the Board did not agree to allocate extra funds to HRS pipeline development in May. Because of this, the PySALT vesion is essentially now Steve's private project for the benefit of RSA collaborators, or any individuals striking a deal with him. Not much has happened since June also due to the passing of DoD who was a driving force behind this development.

2.5.3. The Way Forward

We need to decide what to do. If HRS pipeline is still P0, it crucially needs the required attention, to push for the required funds and resources.

Recently, the Board chair agreed to use contingency funds to hire an astronomer for 3 months to run Steve's HRS pipeline, starting November, on any new and previous data sets. This hopefully will show the maturity of the pipeline version during which we should plan a more detailed development plan ahead including detailed requests for additional funds.

2.5.4. Resources Needed and Amount of Time

Not defined at this point.

Issue	People	Cash Required	Time	Responsible Person	Short Project Plan	Priority	Progress
HRS Pipeline	Eric+team	None	?	Eric	contingency funds to run existing version of pipeline for 3 months.	P0	Needs funds and resources.

2.6 FALSE ALARM ERRORS (DENEYS)

2.6.1. The Problem

- There are too many alarms and warnings at the telescope.
- SAs and SOs do not know which ones to take seriously and sometimes just "click away" all problems reported on SOMMI. Serious real errors can be, and have been, ignored because of the chatter.

2.6.2. Progress report since March 2015

The SA/SO wishes at the March meeting:

a) Check which warnings and alarms are truly needed; b) Provide an easily visible list of sub-systems and their acceptable temperature, pressure, humidity ranges which have to be "taken seriously" when an error is reported; c) For the warnings and faults, which do produce a pop-up, the pop-up should already suggest what to do; d) SOs and SAs and standby staff should have a repository of known issues and work-arounds and fixes, need of training?

Work-plan from S/W in response:

- Audit each subsystem's errors and improve the alarm text
- Create central repository of safe ranges (to augment alarm text)
- Update each sub- system's software to not generate false alarms
- Define a hierarchical system of handling / masking alarms
- Implement a heuristic filter in TCS that can "downgrade" alarms to warnings.

Good progress - All the high-frequency false alarms have been identified and many dealt with within their subsystems. Release of the new BMS will address most of the remaining ones.

2.6.3. The Way Forward

The status of current errors under investigation can be seen in the table below:

Code	Subsys	Text	Proposed solution	Current status
7120	SDC	Structure error	ECR against SDC?	Raised due to TCS interlock input
7227	BMS	Dewpoint out of range	New BMS to address this	Pending on new BMS
7231	BMS	PLC communications failure	New BMS to address this	Pending on new BMS
7421	TC	Serious tracker failure		Root cause analysis complete — need to analyse data
7429	TC	Brakes-release error		Root cause analysis complete — need to analyse data
7502	Payload	Payload comms lost		Root cause analysis to be done
7821	HRS	None		A false HRS error that can be corrected in the SEQ
9007	TCS	Interlock panel logic	New BMS to address the remaining issues	6 - Glycol Flow OK overridden by the TCS to a True value New BMS to provide valid values for: 8 - Tracker Normal Speed Enable, 9 - Tracker Speed Lockout, 10 - Structure Normal Speed Enable, and 11 - Structure Speed Lockout
9028	TCS	Tracking with louvres closed		Currently suspect 50% of this is caused by the daily test track — to be confirmed

2.6.4. Resources Needed and Amount of Time

ETA?

Issue	People	Cash Required	Time	Responsible Person	Short Project Plan	Priority	Progress
False Alarm Errors	SW team	None	6 months	Deneys		P0	Good progress. All the high-frequency false alarms have been identified and many dealt with within their subsystems. Release of the new BMS will address most of the remaining ones.

2.7 SCHEDULING TOOLS (PETRI, PAUL K.)

2.7.1. The Problem

SALT Science observations could be done more efficiently with more intelligent nightly and seasonal scheduling

2.7.2. Progress report since March 2015

The aspects that were promised to be done by the Board May meeting were done, in particular the Semester simulations (separate documents about the results.) Also, block scoring was implemented. Issues were identified in the time allocation process that hinder high efficiency program completion; however, the Board decided that we should concentrate on finishing P1 and P2 blocks only without regard to program completeness. There have been updates since June too, e.g. the first version of target probabilities to WM in phase-1 and updates to the block scoring.

2.7.3. The Way Forward

Next steps include:

- Phase-2 block probabilities for PI use on the WM.
- Simulate 2015-2 when phase-2 is done.
- Analyse the 2015-2 sims to check implications for observing scheduling in Nov / Dec.
- Check whether Block scoring has made a difference in P1/P2 completion in 2015-1 when it finishes, report to Board in Nov.
- Come up with a longer term goal for scheduling. Is "optimal" scheduling realistic?

2.7.4. Resources Needed and Amount of Time

Paul K. to continue work on the coding under supervision of Petri and consultation from Brent, Encarni, Steve C. and others. Long term goal TBD.

Issue	People	Cash Required	Time	Responsible Person	Short Project Plan	Priority	Progress
Scheduling Tools	PV / JPK / BM / ERC / SAs as needed	None	6 months	Petri	Analyse 2015-1 and simulate 2015-2. Update scoring etc.	P0	Promised bits done. On-going dev. work through to 2016.

2.8 RSS POLARIMETRY (STEVE P., ÉRIC)

2.8.1. The Problem

RSS Polarimetry mode will need to be re-commissioned.

2.8.2. Progress report since March 2015

[please edit if needed] Steve P. as the SAAO Polarimetry expert and Éric as the RSS instrument scientist were tasked to drive the process. All necessary hardware has arrived and been installed. Mechanical tests have been successfully done.

Software development to insert engineering observations to the telescope queue is being done currently. Couple of months behind schedule currently compared to plan in the June SALT Ops performance contract ('operationally commissioned by end of Oct').

2.8.3. The Way Forward

[please edit if needed] On-the-telescope commissioning, and science commissioning plan, to be presented. All the activities, including science commissioning, will stay in-house to avoid the past mistakes of assuming the community will help in the commissioning.

Closed dome polarimetric calibrations should start soon, as well as on-sky tests starting with polarimetric standards.

Polarimetric RSS data reduction training needed. Ken N. has offered skype sessions.

2.8.4. Resources Needed and Amount of Time

[please edit if needed] Time scale to be drafted. Goal was to offer the mode for 2016-1, which would need firm results from on-sky science to be achieved by December 2015.

Issue	People	Cash Required	Time	Responsible Person	Short Project Plan	Priority	Progress
RSS Polarimetry	SBP/Eric	None	6 months	Steve P		P0	Commissioning in progress. Not on-sky yet.

2.9 STRAYLIGHT (BRENT, KEITH)

2.9.1. The Problem

Unwanted light, stray light, gets inside the Payload in particular on the RSS detector. During the RSS optics service in 2014 there was a renewed effort to block this light. How has this worked?

2.9.2. Progress report since March 2015

Post-RSS-service stray light levels were determined to be much lower than previously, both from on-sky and closed-dome lights-on tests. A report was written and updated (June 2015). Standard monthly tests have now been defined.

2.9.3. The Way Forward

The analysis and record keeping of stray light tests has been handed over to Brent, who will inform Keith, who will decide what needs to be done in practice if action is required.

After verification of the June-September tests, this item can potentially be removed from P0 to on-going monitoring status.

However, the goal will be to keep levels of straylight on PDET at the readout noise level, and this should be rigorously monitored.

2.9.4. Resources Needed and Amount of Time

See table. [edit if needed]

Issue	People	Cash Required	Time	Responsible Person	Short Project Plan	Priority	Progress

Stray Light	Keith / Brent	None	On-going	Keith / Brent	Target of stray light is readout noise level.	P0	Level verified. Checks standardised. Needs on going monitoring.

3 P1 PROJECTS

3.1 RSS THROUGHPUT (OCKERT)

3.1.1. The Problem

- RSS's Collimator suffers from light loss. Even after the dramatic improvement following the optical service, there is still a significant UV deficiency as well as 15 per cent (over that expected for the collimator) at about 800 nm.
- Critical. Cannot do 10-m science.

3.1.2. Progress report since March 2015

The project was not funded in the May Board meeting and is pending. RSS will require are cleaning service in 2016 in any case. There are signs of the RSS throughput slowly degrading (e.g. Petri's throughput report in June 2015).

What should the plan now be for the next half-year and budget and Board requests?

Schedule annual RSS take down for service during winter bad weather months. Clean optics and replace fluid as per SOP.

3.1.3. The Way Forward

- [please edit – text below is from the previous doc]
- New collimator doublet and triplet lenses, figured and coated, have recently been received in Cape Town.
- Replacing the existing doublet and triplet will lead to still further significant improvement, especially in the UV.
- The one hitch: the coupling fluid attacks the elastomer which holds the lenses into their metallic cells and Ockert is currently battling to determine a viable way forward for this problem.

3.1.4. Resources Needed and Amount of Time

[please edit – text below is from the previous doc] The unplanned optics service hit the project budget hard. After the cleaning exercise there were various scenarios proposed, each requiring a budget increase. Those solutions have not yet been decided upon. The integration of the NIR will have a significant effect on this decision and various scenarios are being investigated. The current proposal only the Triplet and Doublet and the following project budget and schedule was submitted to the BEC:

Phase			Comments
Contingency	R 233 786.70	R 248 917.29	Contingency 35% on DPC, 15% on Manpower
Sub Total	R 901 748.70	R 1 908 365.85	
Less remaining funding		R 1 094 074.56	Chemically compatible, athermal Elastomer bonds, Alignment Technique,
Grand Total (Shortfall)		**-R 1 716 039.99**	
Stage 1 - Mechanical Concept Design and Production			
Stage 2 - Triplet Design and Production			
Stage 3 - Doublet Design and Production	R 84 000.00	R 591 030.60	
Stage 4 - Facility Development	R 407 262.00	R 0.00	Build and buy all the tools to do the alignment and bonding.

Fin Year	2014	2015				2016			
Project Phase	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Stage1	Concept	Concept							
Stage2			Detail Design	Industrialisation	Production	Assembly + Test			
Stage3				Detail Design	Industrialisation	Production	Assembly + Test		
Stage4	Facility	Facility	Facility	Facility	Facility	Facility			
Cash Flow	R 464 871	R 1 273 623				R 531 833			

Issue	People	Cash Required	Time	Responsible Person	Short Project Plan	Priority	Progress
RSS Throughput	OS + drafter	R1.7 M	18 months	Ockert	Replace RSS Collimator Triplet and Doublet	P1	Proposal done. Not budgeted. No movement?

3.2 SAC THROUGHPUT (TBD. OCKERT?)

3.2.1. The Problem

- Although not established with absolute certainty yet, it is believed that the throughput seems perhaps 20-30% lower than optimal
- Important. Will definitely help the faintest/fastest science, and is counterproductive to make an effort to keep other things clean when the SAC is not treated at all.

3.2.2. Progress report since March 2015

The project is pending. What to do after DoD's passing?

Note that the *ADC* cleaning in May 2015 had a significant effect on overall throughput. It is thus expected that a similar cleaning of the SAC would have at least a similar effect. How to do it? How to quantify the throughput of only the SAC, independently?

We have a concept to measure the throughput of the SAC with a modified interferometer and mirror mask in RSS.

3.2.3. The Way Forward

[please edit if needed – text from the March version] During the image quality repair, it was possible to clean three of the four SAC mirrors. Two of the three mirrors seemed in good shape after cleaning. However, at the time of the cleaning of M5, it was apparent that many pinholes and other minor damage to the coating remained after cleaning. This mirror is upward facing and takes the most damage from the harsh environment. How can the SAC problem be addressed?

- A spare SAC is clearly unaffordable (the original cost over one million euros and SALT does not have the money at the time of writing)
- What about removing it and recoating? During this time, the SAC would be removed,

and the mirrors be shipped overseas for recoating, followed by re-integration, re-alignment and re-installation. Accepting telescope downtime of 3-6 months would be painful and probably unacceptable to the SALT Board.

- These possibilities may not be needed if a lower scope of work were accepted. For example, it is likely that the downward looking mirrors M2 and M4 are in good condition. As mentioned, M5 is likely to be the major problem, with M3 second priority. Is it possible to remove these mirrors from the telescope and clean them?
- All the above solutions would be temporary as dirt would build up again. A permanent solution would involve procuring a new M5. With a new coating on it, and a slightly altered prescription, it may be possible to seal the SAC with fused silica windows, a strategy followed by HET in their new Wide Field Corrector.
- Meanwhile, we might have to remove M4 (Bless James) to clean M5 in-situ. With proper planning the can be done with relatively low risk. We will have to remove the RSS and RS to give proper access to the SAC.
- We have to prioritise funding for the worst case scenario of replacing M5 in the next 4 to 5 years. For this we need a thorough investigation with recommendations.

This is clearly a major project.

3.2.4. Resources Needed and Amount of Time

Unknown until the solution is defined.

Issue	People	Cash Required	Time	Responsible Person	Short Project Plan	Priority	Progress
SAC Throughput	DOD / OS	Small	12 months	TBD - was Darragh	Inspect the SAC. If the dust is significant than we know we need to clean.	P1	Not budgeted. No movement.

3.3 DETECTOR AND INSTRUMENT PERFORMANCE MONITORING (STEVE C.)

3.3.1. The Problem

Detector and instrument internal optics performance is not currently being monitored routinely so that problems become known only when they are so serious they are obvious. This detracts from the optimal performance of the telescope and leading to poorer quality data.

[Note there is another item on Optical performance monitoring – some items may be overlapping, but these two are separated essentially along the lines of who would address the issue. This one more Astro Ops related.]

3.3.2. Progress report since March 2015

The project is pending due to lack of time and resources. It is on the to-do list of Astro Ops as “Data Quality”. Can SALT software team be included in some aspects, e.g. providing automatic measures of PDET and SCAN and the HRS detectors?

3.3.3. The Way Forward

Develop routine and dedicated *automatic* checks and procedures to the data pipeline coming

out from the telescope, aka *Data Quality Control*. Items monitored include both detector and instrument optics issues, such as (but are not necessarily limited to):

- RSS VIS internal focus
- RSS NIR (It should be noted that RSS NIR may have its own unique stray 'light' problems).
- SALTICAM
- RSS line-spread-profile
- HRS arc stability
- bias levels and overscans
- gain levels and long term gain calibs
- Other?

3.3.4. Resources Needed and Amount of Time

Not defined yet. Needs significant AstOps involvement, and needs a dedicated drive.

Issue	People	Cash Required	Time	Responsible Person	Short Project Plan	Priority	Progress
Detector Performance Monitoring	Steve C + Christian	None	2 FTE months	Steve C	Identify the different data quality measurements that are required. Write software to log them into the database. Integrate display of the results into the SALT dashboard pages	P1	No movement? Data-quality process on a ToDo list.

3.4 RSS FABRY-PÉROT MODE (TED, ENCARNI)

3.4.1. The Problem

- Etalon support flexure prohibits dual-etalon operation: HR mode unavailable, MR compromised.
- Unstable etalon parallelism: efficiency problem, requires adjustment nightly, not always possible.
- Limited wavelength ranges calibrated, calibration a mission.
- Faint monochromator output: limits usefulness, will become more important when doing HR.

3.4.2. Progress report since March 2015

Situation in March:

- New support mechanism installed and evaluated, looks promising.
- Cause of parallelism instability unknown, TW and ERC working on software upgrade
- TW and SAs to develop a calibration plan.
- Awaits new calsys implementation for tests, fiber output coupler may need alingment

Now:

- Wavelength regions needed for science this period have been calibrated.
- Parallelism appears to be more stable than half a year ago?
- However it was found that the MR wavelength resolution is severely degraded, due

to coating degradation. LR has fared better.

3.4.3. The Way Forward

[please edit if needed]
Take out MR. Need to assess the costs for its repair.
Can the etalons be sealed somehow to mitigate coating degradation?
Need to commission dual-etalon soon to use HR instead of MR.

3.4.4. Resources needed and Amount of Time

Not defined. But clearly needs both SA and Tech.Ops involvement.

Issue	People	Cash Required	Time	Responsible Person	Short Project Plan	Priority	Progress
RSS Fabry-Perot	Ted+ERC+Keith+Eben	None	TBD	Ted	Commission dual etalon mode off sky (calsys) and on sky	P1	LR/MR calibrated. MR deteriorated. HR not yet commissioned.

3.5 SHORT TERM SOFTWARE FIXES (JANUS)

3.5.1. The Problem

There is a large number of small software changes which could make the *operations* more efficient from trivial config changes to larger MMI functionality changes of some modes (e.g. FP, MOS, HRS). These need to be identified and prioritised.

3.5.2. Progress report since March 2015

The set of goals in March 2015 was this:

- Payload calibration system upgrades
- Payload parallel operation
- Payload robustness
- FITS header consistency
- WebSammi, TodoList, ELS Web- Viewer hand-over
- PCON: Fabry-Perot workflow improvements

Some progress. Calibration system upgrade complete. Parallel operations supported by payload software, integration with TCS/SOMMI to be finalised. Payload robustness improved for fold-mirrors. WebSAMMI Handovers complete. Normal ToDo complete. Repeatable ToDo items in progress. PCON/FP workflow not addressed yet.

3.5.3. The Way Forward

Coordination should continue between the Software team, Ast Ops, and Tech ops, to determine which software projects exactly are the most crucial to improve immediate night-time efficiency as well as long term needs. Current list of items:

1. Payload parallel operation
2. Payload robustness (allow more degraded state operation)
3. FITS header consistency (upgrades to SCAM/PDET)
4. PCON: Fabry-Perot workflow improvements
5. SOMMI overhaul

3.5.4. Resources needed and Amount of Time

SALT Software team + AstroOps, details TBD. Very little SW time currently available for this project.

Issue	People	Cash Required	Time	Responsible Person	Short Project Plan	Priority	Progress
Short term S/W Fixes	JB, DM, AK, SH	None	TBD	Janus		P1	Some progress. Calibration system upgrade complete. Parallel operations supported by payload software, integration with TCS/SOMMI to be finalised. WebSAMMI To-Do list complete.

3.6 SEEING MONITOR, I.E. TIMDIMM (PAUL K.)

3.6.1. The Problem

Timdimm behaviour is still flaky, sometimes works sometimes not. Main problem has been lack of resources (time) to fix what is necessary both in software and hardware.

3.6.2. Progress report since March 2015

Timdimm has been handed over to Paul. TIMDIMM is working more regularly, but still not totally reliable.

3.6.3. The Way Forward

[please edit if needed] Time needs to be prioritized in the short term to get it running and to find a stable solution. Will extra funding be needed? This needs to be set up as a project if judged a high priority.

Next steps would also include: Get the all sky camera out of the ox-wagon. Get a DIMM tower installed. How high priority are these?

3.6.4. Resources Needed and Amount of Time

[please edit if needed] 3 months to check current S/W and service the mount, install a hard limit switch.

Issue	People	Cash Required	Time	Responsible Person	Short Project Plan	Priority	Progress

Seeing Monitor	JPK + SC	R30k (NOT including the DIMM tower)	3 months	Paul	Check the current hardware and service the mount. Clean-up and improve the current software. Install a hard limit switch on the mount	P1	Working, but no major overhaul yet. Add DIMM tower.

3.7 LIGHT POLLUTION (CHRIS)

3.7.1. The Problem

The Sutherland Observatory site is a very dark astronomical site with 21.9 mag/sq.arcsec in V-band at zenith, even when considering world wide best sites. Everyone at SAAO who work, live or visit the Sutherland site should keep the observatory dark at night. However, this is clearly not conformed to at the site with numerous lights visible to the plateau from the Hostel and other residences, with lights frequently left on in the Rec Centre without anyone bothering to switch them off.

Sutherland Observatory does not look like other international astronomical sites at night.

There is another crucial issue: we are trying to enforce lighting regulations to energy developers outside the Sutherland CAAA, when we ourselves continue to contravene these regulations inside the CAAA. Some of these developers do come and visit the Observatory at night to see what we are trying to protect, and it is embarrassing, to say the least.

3.7.2. Progress report since March 2015

Chris was made over-all responsible at the meeting, though astronomers can and should give input. Luke came up with a list of required curtains at the Hostel and residences and Rec.Centre, help talks about the issue in CT and Suth, and has a list of 'offenders'. No practical movement afterwards towards regulations or fixes yet.

3.7.3. The Way Forward

[please edit] This is clearly an attitude issue. If everyone on site truly understood the need for darkness *and* there were resources allocated to address the problem (astronomy friendly lighting, real blinds on windows) this could be easily solved.

Red lights outside residential buildings to be removed. Checklists for personnel. Use the list provided by Luke to get new blinds.

How will this all be policed? Are there any incentives for residents to make their houses more light tight?

3.7.4. Resources Needed and Amount of Time

It is not clear who is ultimately responsible to push the issue (it is an SAAO issue as well) and what is available to resource.

Issue	People	Cash Required	Time	Responsible Person	Short Project Plan	Priority	Progress

Light Pollution	CC+LT+JM	R50k	ongoing	Chris/Luke	o Implement a checklist for Site standby personnel to follow-up and switch-off sources of light pollution o Make up a list of required blinds and or curtains in hostel and Rec Center o Procure and install blinds and curtains. o Decide how residents could be compensated for making their houses more light tight	P1	List of 'offenders' and needed curtains made. No practical movement afterwards towards regulations or fixes. Red lights outside residential buildings to be removed.

3.8 NIGHT TIME TECH.SUPPORT RESPONSE (CHRIS)

3.8.1. The Problem

Can lose 20 mins or more per call. This adds up. Difficulties are often experienced especially in the beginning of the night.

The situation had already improved (needs to be quantified) since implementing handover procedures and checklists, and dummy track execution at the end of each day and before the night begins. However, there is still unnecessary downtime (needs to be quantified) due to standby not being quickly available.

3.8.2. Progress report since March 2015

Many of the technical errors still appear to be happening in the beginning of the night. Looked at various options re. management of overtime and TOIL. So, is it possible to have standby at the control room in the beginning?

3.8.3. The Way Forward

[please edit, text from the previous version] Other professional service mode observatories have close-by standby available. Could this be organized, for example, such that standby staff is required to be in the control room (depending on weather) until the first science block is underway? Could the duty techs not go on to different hours when they are on call? This is under consideration but will have other fall-outs like lack of the standby people's capacity to fix things during day time, which will defeat the object to a certain extent.

3.8.4. Resources Needed and Amount of Time

TBD.

Issue	People	Cash Required	Time	Responsible Person	Short Project Plan	Priority	Progress

Night time Tech. Support Response	CC + tech.standby	None (but TOIL increases)	ongoing	Chris	Standby people to be at hand for one hour after night operations have commenced	P1	Expanded hand-over status tests and check-lists. Looked at various options re. management of overtime and TOIL.

4 P2 PROJECTS

4.1 LONG TERM TELESCOPE SOFTWARE FIXES (JANUS)

4.1.1. The Problem

Communication between for example the TCS and subsystems is currently HTTP-based and while generally reliable, can be improved by new technology becoming available on the market (e.g. EtherCAT and Data-Distribution-Service (DDS)). Alternatives for the current control system-architecture can be researched and implemented. This will result in better user interface handling and reliability and can be ported on operating systems such as Linux. This will further result in minimising obsolescence of interface cards, computers and operating systems, and redundancy can be improved. Many aspects of observing are still performed manually (e.g. configuration of calibrations) and can benefit from improvements to the Observation Control System (OCS).

4.1.2. Progress report since March 2015

Some Progress. Payload and TCS software ported to Linux - test systems completed. DDS middleware ported to and successfully tested on all operating systems used on SALT.

4.1.3. The Way Forward

A feasibility study will have to be launched to determine the costs and man hours for improvements. Improvements to observation automation by extending the functionality and developing a web-based user interface for the OCS are planned.

Significant progress in implementing DDS as middleware protocol has been made and feasibility tests will commence soon. National Instruments are in the process of costing possible upgrade options for existing control systems on the Payload and RSS-VIS. More modular subsystem design using Linux embedded controllers being pioneered by RSS Guider project.

4.1.4. Resources needed and Amount of Time

SALT Software team. Initial estimates indicate that two extra software FTEs are required for many tasks relating to improving and extending the telescope control system as well as providing dedicated support to instrument software. One FTE hired by RSS Guider project that impacts on these goals to some extent. Not enough resources currently available to progress with OCS related work. NIR integration and PCON obsolescence tasks are also deferred until 2016.

Issue	People	Cash Required	Time	Responsible Person	Short Project Plan	Priority	Progress
Long Term Telescope S/W	JB + all SW	Small-Medium	12-24 months	Janus	1. Data Distribution Service: Roll out DDS as middleware on the SALT control system 2. Payload on Linux: Port all Payload drivers and hardware interfaces to Linux for more robust operation. 3. PCON control system upgrade 4. Migrate RSS to new hardware solution	P2	Some Progress. Payload and TCS software ported to Linux - test systems completed. DDS middleware ported to and successfully tested on all operating systems used on SALT.

4.2. OPTICAL PERFORMANCE MONITORING (TBD)

4.2.1. The Problem

Optical performance is not currently being monitored routinely so that problems become known only when they are so serious they are obvious. This detracts from the optimal performance of the telescope.

[Note there is another item on Detector and Instrument performance monitoring – some items may be overlapping, but these two are separated essentially along the lines of who would address the issue. This one more Tech Ops related.]

4.2.2. Progress report since March 2015

No movement in formalizing procedures or getting equipment for direct measurements. An ADC related throughput measurement (on-sky burst tests) were performed by AstOps in May/June.

4.2.3. The Way Forward

Develop routine tests, probably requiring Built-In Test Equipment and modifications to existing equipment, to monitor stray light, throughput and optical performance (aberrations) of the telescope sub-systems including (but not limited to):

- Primary mirror
- SAC [has its own Priority Project already]
- ADC
- SALTICAM
- Fold mirrors and pellicle.
- RSS throughput [has its own Priority Project already]

4.2.4. Resources Needed and Amount of Time

Not defined yet. Some of these are done already such as Primary+SAC+FM+Salticam

throughput and RSS throughput burst measurements from on-sky standard stars. However:

- Extra equipment is needed to derive numbers e.g. from SAC independently
- Numbers need to go to database

Issue	People	Cash Required	Time	Responsible Person	Short Project Plan	Priority	Progress
Optical Performance Monitoring	DOD + Mech Eng+?	Small	24 months	Darragh	Develop methods and hardware to measure the optical performance of sub-systems of the telescope and instruments	P2	No movement.

4.3. LONG TERM PAYLOAD HARDWARE (EBEN)

4.3.1. The Problem

DEFICIENCY	IMPACT OF SOLVING IT
1. Requirement to operate functionality in series, e.g. impossible to simultaneously move probe & configure FIF, focus & move guide probe, move probe & move fold mirror, etc.	Significant Improvement to the overheads related to acquisition of targets on spectroscopic instruments.
2. Requirement to re-home fold mirrors / pellicle during operations	Improve on-sky efficiency and remove the requirement to do some of the re-homing at rho stage at zero degrees.
3. Slow movement of the fold mirrors / pellicle reduces efficiency	Improve on-sky efficiency. SALTICAM fold mirror rotation speed has been doubled. Aux fold mirror can only be addressed when full access can be had to the rotating structure.
4. Reliability of mechanisms and the software control system. Failures at these levels include firmware lock-ups on the guidance camera, as well as sporadic communications failures with various internal subsystems	Minimise downtime. Work was completed to eliminate many of these issues where software work-arounds could be devised.
5. Accessibility / Maintainability – difficulty performing maintenance and repair operations	Reduce downtime due to better access for fault finding and in-situ maintenance. Some current inaccessible devices can be reached (e.g. RSS autoguider)? The new Rho drive has taken care of better accessibility to the rotating structure to execute some maintenance functions
6. Obsolescence – the need to pre-emptively replace parts that are no longer available	Reduce downtime and ensure continued operations.

4.3.2. Progress report since March 2015

[please update, if something to report]

4.3.3. The Way Forward

An integrated study and proposal was put together in 2013 to address most of the payload problems. It was found that some modifications could be done *in situ* and those have been done. Some were done during the RSS Throughput Repair during September and October 2014, but others need the payload to be taken down from the tracker.

4.3.4. Resources Needed and Amount of Time

This is an ongoing process with outstanding issues that can only be reached in the paylod to be addressed during the next RSS down time. See table below for more details.

Issue	People	Cash Required	Time	Responsible Person	Short Project Plan	Priority	Progress
Long Term Payload H/W	EW+JL+ES	? pre-study required	2016	Eben	o Identify all unreliable and or end-of-life and or obsolete hardware in the payload, such as mechanisms (fold mirrors, focus cameras, DMI? etc.) o Design modifications and or new hardware o Install modifications or replace with new h/w where possible, in-situ, and or when the RSS is taken down for collimator repair and or when the NIR is installed Note: many modifications have been implemented in the past so the ones in question can only be reached when the RSS is taken down.	P2	??

4.4. FLATFIELD CALIBRATIONS

4.4.1. The Problem

We still have not figured out how to properly flat field SALT data. Or whether it really can be done at all? Or whether it is worth it, if it can? Or if it can be done and is necessary, what are the steps for Salticam imaging and for various RSS modes? There have been various *ad hoc* studies over the years, but no common consensus has been distilled, nor a plan forward.

4.4.2. Progress report since March 2015

None.

4.4.3. The Way Forward

This item needs a basic study to be able to discuss the way forward. Need to start from gathering info on various previous efforts, reports and opinions.

4.4.4. Resources needed and Amount of Time

Not determined. Some initial steps were formulated in the Table below.

Issue	People	Cash Required	Time	Responsible Person	Short Project Plan	Priority	Progress
Flatfield Calibrations	AK+PV+ast.ops	None	12 months	Alexei	o Assess what is actually needed for science o Assess Ken's and DOD's remarks and other old reports o Plan and run further tests o Implement changes and/or other flat-fielding systems from Nov 2015-2 semester, if something useful has been identified o Cal Screen inside dome?	P2	No movement.

4.5. DOME SEEING INVESTIGATION (OCKERT)

4.5.1. The Problem

Dome seeing not characterised or monitored. Bad dome seeing is noticed only while aligning, looking at the jumping spots of the CCAS. During the night we are not always sure if worsening image quality is due to stack issues or dome seeing.

Dome conditioning does not work when running on generator causing loss of time during the early part of the night.

4.5.2. Progress report since March 2015

None.

4.5.3. The Way Forward

This will become important when SAMS is running. Characterization will need to be started to optimise e.g. the use of louvres as originally planned.

Conditioning needs more power, long term solution needs to be investigated

4.5.4. Resources needed and Amount of Time

See Table below.

Issue	People	Cash Required	Time	Responsible Person	Short Project Plan	Priority	Progress
Dome Seeing Investigation	OS + JPK?	R70-90k	5-7 FTE months	Ockert		P2	No movement?

4.6. OCS

4.6.1. The Problem

Observations at the telescope would need to be automated for higher efficiency.

4.6.2. Progress report since March 2015

No movement.

4.6.3. The Way Forward

Develop updated OCS user interface and workflow at the telescope to automate operations to a much larger degree, see Table below for more details.

4.6.4. Resources needed and Amount of Time

See Table below.

Issue	People	Cash Required	Time	Responsible Person	Short Project Plan	Priority	Progress
OCS	JB / AK / SH / ERC	None	6-12 months	Janus	1. Single-block configuration of RSS, HRS and SALTICAM 2. Configuration of calibrations from the SDB 3. Automation of multi-block sequences, guidance and payload setup 4. Automation of standards, arcs and flats	P2	No movement. No time allocated.

4.7. SDB/FT/STATISTICS (ENCARNI, PAUL K.)

4.7.1. The Problem

We need better automatic logging of both errors and issues and overall performance statistics. These could also be used to make scheduling decisions more intelligent.

4.7.2. Progress report since March 2015

Dashboard and the Fault Tracker were implemented, and have been in regular use in 2015. This has greatly improved statistics on e.g. subsystem breakdowns and overall performance

and facilitated reporting. Next step would be to take this information into account in planning and scheduling more intelligently.

4.7.3. The Way Forward

Data mining of all the databases available?

4.7.4. Resources needed and Amount of Time

See Table below.

Issue	People	Cash Required	Time	Responsible Person	Short Project Plan	Priority	Progress
SDB/FT/Statistics	ERC / JPK / CH / SC +	None	6-12 months	Encarni / Paul	Data mine and analyse data stored in various SALT databases, from the ELS to the SDB, to contribute to and improve short and long term decision making in the running of SALT	P2	FT bits implemented and functioning. Other bits thought about as part of Scheduling. Needs comprehensive plan.

5 P3 PROJECTS

5.1 HUMIDITY CONTROL (OCKERT)

5.1.1. The Problem

The telescope is often obliged to close when the humidity rises too high, but the sky is clear. Paul K. checked the humidity, temperature and cloud weather data of the past 2 years and found that compared to the *2.5 deg dew point delta limit* we would *gain*:

- 4 percentage points of weather downtime if we used 2.0 deg
- 7 percentage points if we used 1.5 deg,
- 12 percentage points if we used 1.0 deg.

In a typical semester of 40% weather downtime e.g. the 1.5 deg delta case could translate to ~100 additional Science blocks done.

However, it is not clear if lowering the limit presents a danger to the prime focus instrumentation, and/or the primary.

In addition, the telescope has suffered from fogging over of its mirror in the past due to lack of humidity control in the dome. The same humidity requires of the night operations team to close the shutter and therefore shortens observing time.

5.1.2. Progress report since March 2015

None?

5.1.3. The Way Forward

[please edit if needed] The next step should be to quantify the level of condensation danger at a given RH and dew point delta. Hence, new sensors should be installed at Payload and possibly elsewhere together with e.g. some exposed metal.

Obviously, any solution would have to avoid condensation on optics and other sensitive equipment. Humidity sensors must be installed in various locations on the tracker, near instruments and the primary mirror. Surface temperature measurements are required to determine a realistic the dew point delta for these different pieces of equipment.

It is proposed that industrial de-humidifiers, or modifications to the current air-handling units, be investigated and installed to mitigate this situation as best possible. A specialist consultant will be contracted to conduct the feasibility study. A previous amount of R50k has been allocated for such a study but that study has not been commissioned yet due to higher immediate priorities on operations and projects. If found to be feasible, such an installation can cost as much as R1m.

5.1.4. Resources Needed and Amount of Time

Study not yet launched but various temperature sensors have been installed on the primary mirror truss etc.

Issue	People	Cash Required	Time	Responsible Person	Short Project Plan	Priority	Progress
Humidity Control Study	OS + ?	R70-90k	5-7 EFT months	Ockert	Perform experiment outside dome with black plate to establish dT due to radiation.	P3	??

5.2 UNSTABLE RSS MECHANISMS (KEITH)

5.2.1. The The Problem

The main problem here used to be the slit mask mechanism. Since the optical service of RSS, when the slit mask mechanism was improved, its performance is vastly better.

However, the grating mechanism, the filter magazine, and articulation are problematic, and failures are a cause of inefficiency.

5.2.2. Progress report since March 2015

[please edit as needed] Small fixes have been made after failures, but no long term solutions(??).

5.2.3. The Way Forward

These mechanisms will need to be modified to make them more robust since it is clear that they are too flimsy and reaching the end of their lives. The priority of those actions must be determined. This item likely needs to be broken down to smaller units and prioritized individually? Or will all be handled at the same time when RSS comes down for service next time??

5.2.4. Resources Needed and Amount of Time

See table below.

Issue	People	Cash Required	Time	Responsible Person	Short Project Plan	Priority	Progress
Unstable RSS Mechanics	KB, EW, WL, MW, ES	None	2 months	Keith	Fix / replace RSS filter, grating, and slit masks mechanisms	P3	??

5.3 STRUCTURE CABLE WRAP STUDY (RAOUL)

5.3.1. The The Problem

The telescope cable wrap is poorly designed needing daily pushing and shoving to minimize down time. On full observing nights it needs to be pushed in during the night as well.

5.3.2. Progress report since March 2015

None?

5.3.3. The Way Forward

Needs a study.

5.3.4. Resources Needed and Amount of Time

See table below.

Issue	People	Cash Required	Time	Responsible Person	Short Project Plan	Priority	Progress
Structure Cable Wrap Study	RvdB	R400k	2016 June	RvdB		P3	??

6' SUGGESTED NEW PROJECTS

6.1. LASER FREQUENCY COMB (ÉRIC)

6.1.1. The Problem

Calibrations for HRS HS-mode using a novel technology demo.

6.1.2. The Way Forward

Have a LFC system for a 3 month period in 2016, define science programs for it, get science out.

6.1.3. Resources Needed and Amount of Time

[please edit]

6.2. HRS SOFTWARE FIXES (JANUS, ÉRIC)

6.2.1. The Problem

Now that HRS has been handed over we need to fix a number of issues making operations more stable and effective. Priority issues include:

-RT 2551: HRS red detector dropping frames

-Redmine tickets:

379	HRS	Terminate exposure leads to incorrect FITS header exptime
355	HRS	HRS MMI - Total procedure time incorrect
350	HRS	HRS Error cluster default for logging
325	HRS	Inconsistent temp array lengths

6.2.2. The Way Forward

A list of issues has been drafted as above. Some of the fixes will be implemented asap, such as the red arm dropping read-outs.

6.2.3. Resources Needed and Amount of Time

Issue	People	Cash Required	Time	Responsible Person	Short Project Plan	Priority	Progress
HRS software fixes	DSM	None	Mid 2016	Janus	Prioritise and address list of HRS issues.	P3	Started work on RT 2551 - dropping of frames.

6.3. UNSTABLE FIF (??)

6.3.1. The Problem

The FIF is unstable and causing downtime. It appears that the cable wrap of the system is causing problems.

6.3.2. The Way Forward

[please edit if needed]

Ockert: We want to build a (line replaceable) spare FIF guider to enable us to swap the unit when faulty.

Should this item be merged with the “Long-term Payload H/W item above currently as a P2 project”? [Suggest to keep it separate - more urgent].

6.3.3. Resources Needed and Amount of Time

TBD. Costs for a spare will be worked out soon.

6.4. RSS FILTER MAG UPGRADE AND BAFFLING (KEITH)

6.4.1. The Problem

Over the last few years we have been getting humidity errors and even the camera window misting up. Sometimes the filter mechanism shows some erratic behavior and the filter can be removed in the middle of an exposure. The baffling around the filter mechanism is not very light tight and is a known light leak. It not easily quantifiable but a redesign of the filter mechanism baffling and mountings will have a positive impact on image quality.

6.4.2. The Way Forward

Wouter started working on an upgraded filter mechanism during the last take down, the design is almost there.

6.4.3. Resources Needed and Amount of Time

With Wouter focused on the filter mechanism for a month should complete the design. Most of the hardware will be reused with only the new mountings and baffling needing manufacturing all of which will not cost an arm and a leg.

6.5. SALTICAM GUIDANCE (??)

6.5.1. The Problem

Guidance using Salticam is very cumbersome. The probe is behind the filters making it difficult to find bright enough stars, and it vignets a huge part of the field of view making it virtually impossible to use for those needing a *field* and doing dithering.

SALT without SAMS has not been an “imaging telescope” at all, so we have lived with it. However, if/when SAMS works, the situation will change drastically, and *will* need to have robust way to focus and guide when doing imaging for users.

6.5.2. The Way Forward

A study is needed on what the options are.

- Is it feasible to get a proper guidance system on Salticam?
- Or is it possible to at least get an automatic focus system (software) even without a new guider?
- Or what would it take to move all future imaging to RSS (i.e. modify or buy new filters there)?

6.5.3. Resources Needed and Amount of Time

TBD

6.6. NON-SIDEREAL TRACKING (??)

6.6.1. The Problem

SALT currently is not able to track non-sidereal targets, asteroids, planets, etc.

6.6.2. The Way Forward

We need to determine the level of need (1-3 programs currently?) and weigh it against the work needed to commission the mode.

6.6.3. Resources Needed and Amount of Time

Janus, 2-3 months.

6.7. RSS NIR INTEGRATION (ÉRIC, PAUL K.)

6.7.1. The Problem

RSS NIR is coming in ~2 yrs. We need to be ready for it.

6.7.2. The Way Forward

[PLEASE EDIT FOR CURRENT SITUATION]

6.7.3. Resources Needed and Amount of Time

TBD
For the S/W aspects: Anthony + ?? Currently limited software resources available to assign to this.

6.8. STGS, DOD SPECTROGRAPH (??)

6.8.1. The Problem

Who will take this project further? How?

6.8.2. The Way Forward

TBD

6.8.3. Resources Needed and Amount of Time

TBD

6.9. BMS OVERHAUL (??)

6.9.1. The Problem

BMS needs a complete overhaul to be more effective and stable?

6.9.2. The Way Forward

[PLEASE EDIT FOR CURRENT SITUATION]

6.9.3. Resources Needed and Amount of Time

TBD

6.10. TCS SOFTWARE OVERHAUL (JANUS)

6.10.1. The Problem

TCS needs a complete overhaul to be more effective and stable?
[Janus] Old issue? Memory leak solved - TCS server stable since. Does this issue relate to the TCS server, or the greater system including SOMMI, SAMMI, OCS, etc?

6.10.2. The Way Forward

[PLEASE EDIT FOR CURRENT SITUATION]

6.10.3. Resources Needed and Amount of Time

TBD

6.11. GROUND-LAYER AO AND/OR TIP-TILT IQ CORRECTIONS (??)

6.11.1. The Problem

We could potentially improve SALT image quality significantly with fairly “simple” tip-tilt image correction systems in the Payload for Salticam and HRS. These may (or may not) be similar to ideas pursued by Steve C. and Laure Catala in the ground-layer AO investigations.

Due to the nature of the Sutherland site, even with SAMS running perfectly, SALT would never be an “imaging telescope” or even a faint-object (below sky-background) extra-galactic spectroscopic telescope without some level of AO-correction.

6.11.2. The Way Forward

Some time soon SALT needs to make a clear strategic decision whether this is a way to go in future development. If so, investments for resources need to be allocated for a proper feasibility study to be able to make the decision.

[PLEASE EDIT FOR CURRENT SITUATION of GL-AO INVESTIGATION]

6.11.3. Resources Needed and Amount of Time

TBD.

6.12. REPAIR MR ETALON (TED)

6.12.1. The Problem

The MR etalon has deteriored significantly, has been taken off the telescope.

6.12.2. The Way Forward

TBD

6.12.3. Resources Needed and Amount of Time

TBD

6.13. SHUTTER SEALING (??)

6.13.1. The Problem

The dome shutter needs to be sealed against leaks.

6.13.2. The Way Forward

TBD

6.13.3. Resources Needed and Amount of Time

TBD

6.14. FINALIZE SALT STRATEGY DOCUMENT (??)

6.14.1. The Problem

SALT needs a strategic vision.

A white paper has been produces a year or two ago, and there is a strategic document draft around now. SALT Ops needs to be firmly in the loop, together with the Partners and the Board, to finalize these documents to build a vision of where we want to be in the future. We, after all, know the telescope and its capabilities and strengths and weaknesses the best.

An instrument roadmap needs to be developed on consultation with the Board.

6.14.2. The Way Forward

TBD

6.14.3. Resources Needed and Amount of Time

TBD

6.15. KEY SCIENCE PROJECTS (??)

6.15.1. The Problem

There is a need to focus SALT science more. Key/Partnership Proposals are possible even now, but none have been submitted. To take a step in that direction, it has been suggested that SAAO/SALT astronomers come up with a large South African project of their own, where others could be invided.

6.15.2. The Way Forward

Initial informal discussions held amongst the SAs and other SAAO astronomers.

6.15.3. Resources Needed and Amount of Time

TBD

6.16. VARIOUS FEASIBILITY STUDIES FOR LONGER-TERM PROJECTS (??)

6.16.1. The Problem

In addition to the GL-AO and STGS spectrograph projects mentioned already individually, the following ones have also been suggested as needing feasibility studies:

- smart focal planes
- other software issues (?)
- 10-yr scale wide-field multi-fibre (hundreds) instrument
- 10-yr scale fully or partially steerable SALT

6.16.2. The Way Forward

TBD

6.16.3. Resources Needed and Amount of Time

TBD

6.17. ENHANCING SCIENCE PRODUCTS (PETRI)

6.17.1. The Problem

This section will likely be developed into its own document since its scope is different from the rest. It is more an umbrella Project including several individual ones, such as pipelines, time allocation strategies, block scheduling algorithms, good communication of instrument and other capabilities, data products and archiving. Nevertheless, the Problem is this:

SALT is currently suffering from a reputation of low science productivity. There are (at least) two ways to address this. One is by improving the quality of the science data coming out of the telescope, and most of this document addresses this aspect.

Another important way to address low scientific productivity is improving science deliverables to the SALT community though providing pipeline reduced data. This would have the potential to decrease the time between receiving data and eventual publication.

Right now there is only one person responsible for the SALT pipeline development, the SALT Data Manager S. Crawford, who is, in fact, funded 100% by SAAO. The situation dates to a 2004 decision by the SALT Board that they were not interested in supporting a data reduction pipeline, but would rather just receive raw data. Things have now changed and basic pipeline reductions are expected, as well as higher level reduced data products especially for the more complicated data modes (e.g. HRS). If science output of SALT is taken seriously, this expectation needs to be addressed.

Finally, there may be a need to re-visit the basic strategies of SALT time allocation and to educate the user-base to propose for types of programs making most efficient use of SALT.

6.17.2. The Way Forward

Pipeline development for both HRS and RSS, including the upcoming polarimetric mode and future NIR arm, should receive high priority if science output by the SALT users is taken seriously by the organization.

It would be appropriate to increase the Ast Ops staffing to finally include dedicated pipeline data reduction and quality control support (perhaps by 2 FTEs including funding the one SAAO position).

Ast Ops should engage the users, TACs and the Board with feedback and advice. This should include advice and help with data reduction and analysis and time allocation principles.

Review and discussion of bottlenecks in the whole SALT science data process from data to papers should continue.

6.17.3. Resources Needed and Amount of Time

This is a work in process and will get ongoing attention to identify and address all bottlenecks in the process (Chris, Petri, and all Astro Ops).

In addition, here are some of the critical pieces of software, in particular, developed by the Astro Ops that are needed for the ultimate goal of enhancing science products. Many of these run well already, the greatest bottleneck currently are the pipelines.

- Instrument pipelines - HRS and RSS in particular (Steve C., Éric, Alexei)
- Nightly and Semester Scheduling tools (Paul K., Brent)
- Science Data Base and logging of statistics (Encarni, Steve C., Paul K.)
- Fault Tracker (Christian, Steve C.)
- Efficient OPTI and WM and PIPT (Encarni, Christian)