The SALT project became reality under the leadership of the late Dr. Bob Stobie, the previous director of the South African Astronomical Observatory (SAAO). He was tasked to acquire a new, bigger telescope to upgrade the ~50 year old facilities of the SAAO by the National Research Foundation (NRF), its governing body. The SALT Foundation was founded with the purpose of constructing and operating SALT for scientific and educational use, and belongs to 11 partners from South Africa, Poland, Germany, the UK, New Zealand and the USA.

SALT kicked off in January 2000, when a team of engineers started working on the project at the premises of the SAAO in Cape Town. After spending most of 2000 doing research, analysis and writing specifications, groundbreaking took place on September 2000 at the site of the SAAO near Sutherland in the Northern Cape. By mid 2001 most of the concrete work was completed, and the steel and insulation panel wall construction was completed by the third quarter 2001. The super-accurate concrete pier on which the telescope rotates on air bearings was completed by early 2002.

The telescope structure, a 60 ton steel design, being manufactured in Pretoria at the time, was dismantled and transported to site in March 2002, where it was re-assembled and lifted into the building in two pieces by a huge crane. The mirror truss, a steel space-frame consisting of >1800 struts, followed soon after. The dome, a large space-frame made from aluminium extrusions and clad with aluminium-sided insulation panels was constructed on site and lifted onto the building by July 2002, with the dome shutter following in October 2002. Once the dome was closed, work inside the building continued, and the electrical and computing systems were installed.

The first seven hexagonal mirror segments were installed in early 2003, (there are currently 79 installed) together with their groundbreaking alignment system, and the alignment of these mirrors has been done successfully. These mirrors are shaped to an accuracy of a fraction of the wavelength of visible light, and the different segments - eventually there will be 91 - have to be aligned to the same accuracy. This means that each mirror must be aligned with the six mirrors around it to within 50 nm (50 x 10^{-9} m). The alignment system consist of an optical system for initial alignment and a capacitive edge sensing system for alignment maintenance.

The prime focus tracker - a 4 ton “robot” developed by RRS, which houses the astronomical instruments - was installed in the last half of 2003. This device has to move accurately in all directions to 10 microns, 15m above the primary mirror, and is one of the most accurately controllable machines ever constructed in South Africa. The first astronomical instrument to go onto the tracker was built by the SAAO and has been used to commission SALT. This instrument is called SALTICam, (SALT Imaging Camera), and will be used primarily to record high definition images of the sky, while the next instrument - the prime focus imaging spectroscope (PFIS) which is being built by Wisconsin University, one of the SALT partners - will be used primarily for spectroscopy. The PFIS will be delivered in early 2005.

SALT is a very complex telescope and is impossible to operate without computer control. This is due firstly to its fixed elevation design whereby the movement of celestial objects is tracked using the prime focus tracker which has 10 axes of motion and which moves the optical payload with a pointing accuracy of 6 µm, and secondly to its multiple segment mirror. To allow for changes due to temperature or movement, each mirror segment has three computer-controlled actuators responding to feedback from edge sensors, keeping it in position with the others (and maintaining a perfect spherical shape). The initial shape is determined by use of an optical sensor mounted at the optical centre of curvature on a tower near the dome. SALT took advantage of the great advances in computer
technology, and the whole control system is PC based, which makes it affordable, easy to maintain and to upgrade, using mainstream high level software. The control system was divided as follows:

- The structure and dome control system to control the rotation of the upper mirror (and aperture) by means of which the telescope is pointed at celestial objects. This system also controls rotation of the dome and the opening of the structure.
- The building management system used primarily to control the environment within the dome structure ensuring that the internal temperature is maintained at the external ambient.
- A tracker control system which allows the moving tracker to observe the required part of the night sky reflected from the primary mirror and to track stellar objects as they move during the night.
- A mirror alignment control system which is used to align the individual hexagonal segments to maintain a perfect spherical surface.
- A tracker payload control system that allows the tracker payload to image light onto the various instruments housed in the payload. This system operates by inserting or changing mirrors to direct light to the particular instrument
- A mirror segment alignment measurement system and a segment positioning system and a centre of curvature alignment sensor for the primary mirror.
- A telescope control system (TCS) which controls all the subsystems and allows the telescope to be operated by a single operator.

All high level (TCS) software was developed in-house, while subsystems were delivered with their software, which had to comply with the SALT specification. To facilitate this, SALT supplied its subcontractors with a software simulator, so that factory level integration could be done to a high level, and final site integration was relatively quick and simple. Most of the SALT software is written in LABView, which reduced programming time considerably.

SALT is funded 33% by South Africa, and 60% of its budget is being spent in South Africa. With the exception of the mirror segment system and the corrector optics, nearly everything has been sourced in SA and 150 local and 15 overseas suppliers are involved in the project. SALT proves that South Africa has the skills to manage and construct such a major telescope, and helps position South Africa to get the square kilometer array project, a US$ 1-billion budget radio telescope project planned to start towards the end of the decade.

With its >10 m diameter primary mirror, SALT will be able to capture extremely faint and thus far-away objects, and it will be ideally suited to studies of the early universe (about 12 billion years ago) to look for quasars and active galactic nuclei, study stellar populations of nearby galaxies, such as the Magellanic Clouds and for use in the discovery of planets around other stars.

SALT started scientific operations in October 2004, and will be inaugurated on 11 November 2005.

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