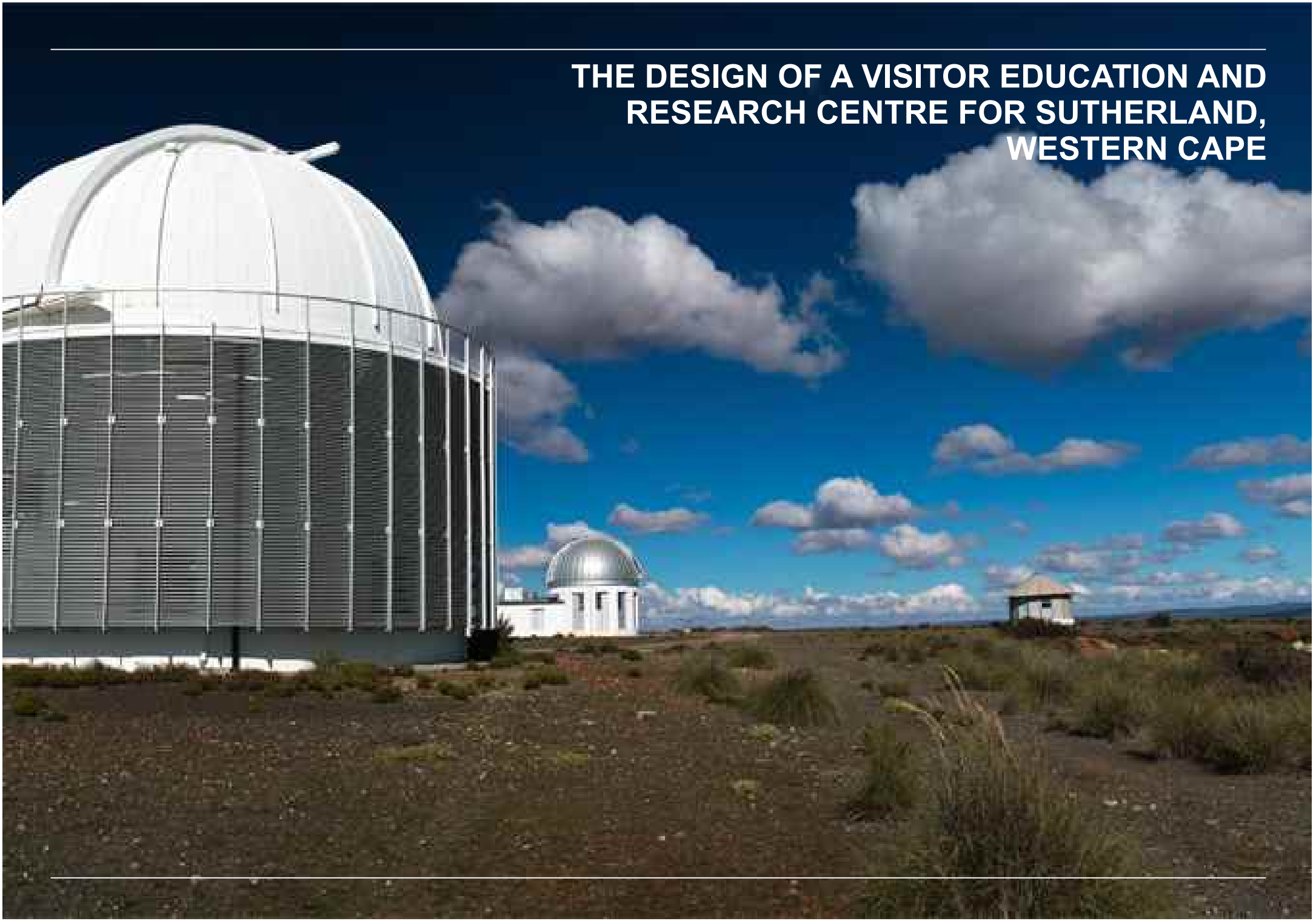
THE DESIGN OF A VISITOR EDUCATION AND RESEARCH CENTRE FOR SUTHERLAND, WESTERN CAPE



THE DESIGN OF A NEW VISITOR CENTRE FOR THE TOWN OF SUTHERLAND AND THE SOUTH AFRICAN ASTRONOMICAL OBSERVATORY

Submitted in partial fulfilment of the requirements of the degree of Masters of Architecture (Professional) at the Nelson Mandela Metropolitan University

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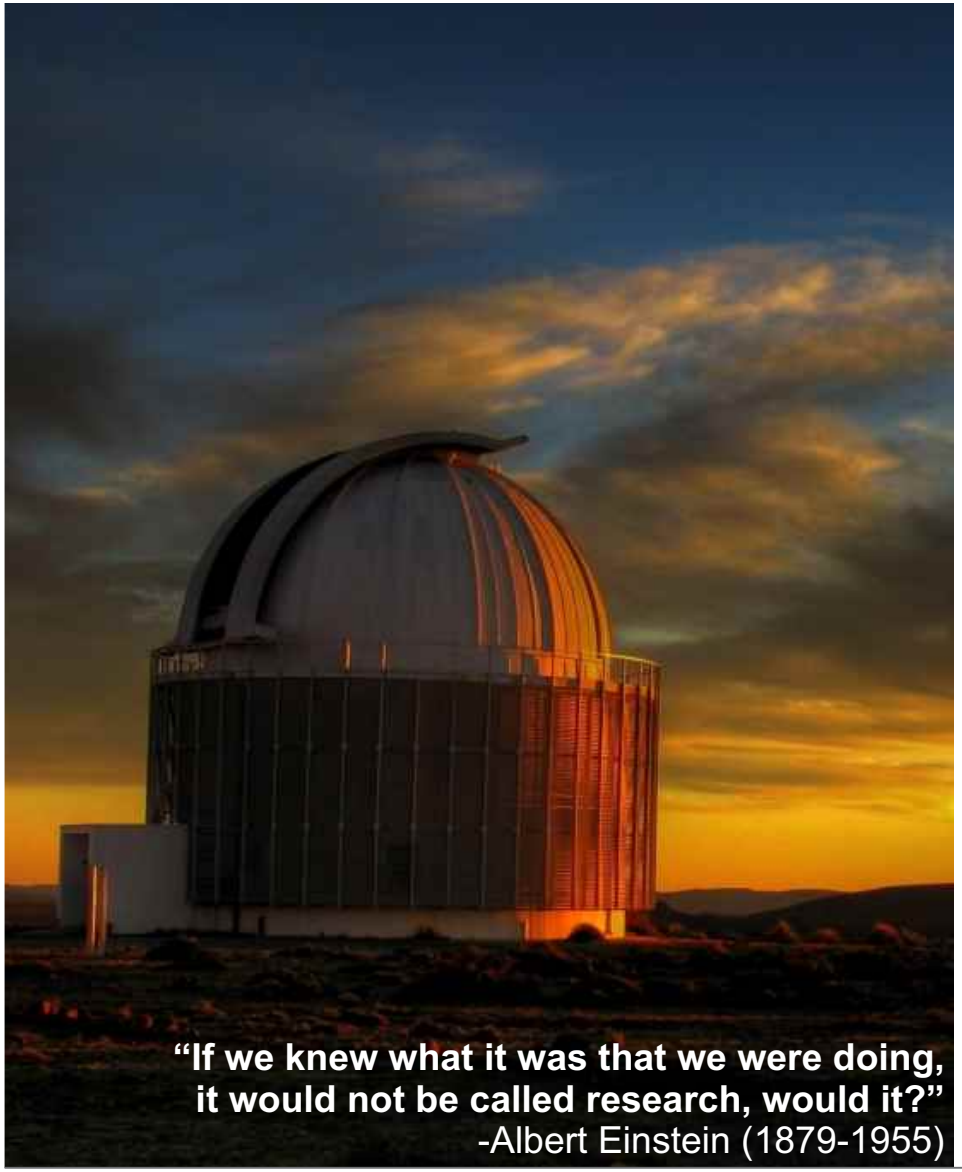
thank *you*



Thank you to all those who assisted me in making this treatise possible.

- God; the architect of my life

- My family; for their continuous support and funding

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- Jurg Wagner in Sutherland

-The local Municipality

-The Astronomical Society of South Africa

- Lecturers; for their insight and assistance

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100 GREATEST
TRAVEL SECRETS

33
See more pyramids in SUDAN
Sudan's ancient past was centred around the Kingdom of Kush, an independent power that dealt with both the pharaohs of Egypt and the emperors of Rome, and which left behind a wealth of archaeological sites along the Nile including temples and necropolises. In total, these deserted, atmospheric sites boast more pyramids than Egypt – in the Royal Cemetery of the old Kushite capital of Meroë, two hours' drive from Khartoum, there are more than 100 pyramids, the largest standing 30m tall.
Peter Eshelby, Explore (www.explore.co.uk)

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Find utopia on
LORD HOWE ISLAND, AUSTRALIA
Seven hundred kilometres north-east of Sydney – head for Fiji, you can't miss it – lies a little piece of subtropical Eden. Volcanically launched from the ocean floor seven million years ago, Lord Howe (*right*) is now home to more than a million nesting seabirds, 100 endemic plant species, about 350 people and – unlike the Aussie mainland – zero poisonous snakes. Visitors come for the birds, bushwalks and reefs (the world's southernmost), but what lingers is a vision of a utopian human community, largely descended from 19th-century settlers: homes are never locked, school uniform is bare feet, and outside the islander-run eco-lodges, the only bar is the bowling club. Eden doesn't come cheap, though: turbo-prop plane or private yacht are the only transport options (go in winter for the best value), and visitor numbers are limited to 400. (www.lordhoweisland.info)

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Star-gaze in
SUTHERLAND, SOUTH AFRICA
With its barren red landscape and eerily deserted towns, the Northern Cape is a far cry from the South Africa most people know. Here the only wildlife spotting you're likely to partake in is counting roadkill on the endless straight roads. Even South Africans tend to overlook their largest and least-populated province, using it as little more than a through route to Namibia.
Some travellers venture along the west coast in spring, when the desert-like landscape explodes into technicolour with blossoming flowers, but inland, at the junction of three dirt tracks and a deserted highway, lies my favourite place in Southern Africa.
It's best known as the country's coldest town, but Sutherland is also the heart of what locals like to call 'Big Sky Country'. Off-limits to anyone without a hire car, it offers simple pleasures – silence, cloudless skies and fine home-cooking. By day it's a lazy place where seldom-seen locals dive for shade in summer and cover in winter. But Sutherland blooms at night, boasting Africa's clearest skies and one of the world's largest observatories – the South African Astronomical Observatory (+27 23 571 1205, www.saao.ac.za – book in advance), 14km east of town. Looking through the telescopes you can make out Saturn's rings – very cool in a nerdy kind of way.
Finish up back in the one-street town, chowing down on Karoo lamb chops in whichever restaurant is open when you visit; local eateries work on a cooperative timetable to ensure they all survive.
For homely accommodation, contact Jurg at the Kambrokind Guest House (+27 23 571 1405, www.sutherlandinfo.co.za; B&B from R300/£17.50 per person). The only paved road to Sutherland stretches for 110km and leads off the N1 between Cape Town and Johannesburg.
Lucy Corne, freelance writer and guidebook author

Figure 1: Extract from Top Travel International, (100 Greatest Travel Secrets) pg69.

1. Project Selection

Through an investigation into astronomy in South Africa, it became clear that a visitor edu-centre was proposed in 2009 for the town of Sutherland by the National Research Foundation (NRF) and the South African Astronomical Observatory (SAAO).

South Africa is also in a bid against Australia to build the strongest radio telescope in the world named the Square Kilometer Array (SKA). If South Africa succeeds in their bid, it will bring a capital investment of £1.5billion to the country. The SKA would be built West of Sutherland and require a command/control room for which the budget is £7million.

The SAAO proposed to incorporate the control of SKA into it's visitor edu-centre.

Sutherland has a huge international tourist potential. This small Karoo town is referred to as the "gateway to the universe" by astronomers and was rated as a must see by Top Travel International for its star gazing.

This realisation led to the choice of project becoming a **visitor education and research centre** for the enhancement of astronomy and the area.

GATEWAY: A CENTRE FOR KNOWLEDGE, SPACE AND RESEARCH IN SUTHERLAND

2. Research methodology

The research methodology involved in this document is directed towards the end goal of a product in built form and the experience thereof. Thus the emergent theory is not confined to the written word, but rather embodies the eventual, proposed product.

In order to formulate a design question and subsequent solution, the extent of the problem has to be investigated using a research methodology. An architectural project is set in an environment that must address both the concrete and abstract needs of the client. This poses a uniquely complex problem. This is further perpetuated by the ambiguity of the client who represents not only the user of the building, but also the developer and manager.

Considering the nature of the site, it is clear that scientific and psychological data should investigated. Therefore, it is appropriate to adopt an approach that would involve both qualitative and quantitative data collection and interpretation. The combination of the two research methods enables one to understand the quantitative data in terms of their human context. (Trochim: 1999) Thus, while this document will take relevant quantitative data into account, this will be done within a predominantly qualitative framework.

As the product, in its capacity as a 'theoretical statement', is unknown at the outset of the project, it will evolve from the initial data collection and interpretation thereof. In light of this, the appropriate research methodology was deemed to be a simple qualitative- quantitative investigation during which relevant literature is reviewed and the experience of the site is recorded. These findings are then synthesized through logical argumentation and graphic analysis to justify the design as an end- product.

3. Why an astronomical centre in Sutherland

Never before have humans known so much about the universe as we do today (Horak, 2007). Never before have we acquired new information about the universe as quickly as we do now. Yet, at the same time, never has the man been so ignorant about even the basic facts of celestial science (Lazich & Wilson, 1994:6).

Technology such as the Hubble Telescope constantly reveals new wonders of the universe. Scientists working in the fields of cosmology and particle physics combine their knowledge in a quest for insight into the origin and destination of the universe and of mankind.

In South Africa a new focus on astronomy as a branch of science was established by the completion of the Southern African Large Telescope (SALT), the largest single optical telescope in the Southern Hemisphere at Sutherland along with 7 other smaller telescopes.
South Africa is a strong contender against Australia, for hosting the international Square Kilometre Array (SKA) which would be an investment of £1,5 billion.
This giant next-generation telescope is being developed by scientists in 17 countries and will consist of thousands of antennas spreading over 3 kilometers.

The SKA is 50 times more sensitive then the most powerful radio telescope we have now. It has the capacity to peer deep into the cosmos to pick up signs of the first stars and galaxies to form after the Big Bang and trace the effects of the mysterious dark energy that is - driving the universe apart at an increasing speed. It is also capable of mapping out the influence of magnetic fields on the development of stars and galaxies.

As South Africa is in desperate need of dynamic young astronomers to man these projects, more young people have to be exposed to astronomy.

The Public Outreach Programme of the National Research Foundation (NRF) towards the South African Astronomical Observatory (SAAO) sets out a number of priorities which should be addressed in the Sutherland area. The aim of this treatise is to deal these issues and these particular aspects are addressed by the development of an educational centre with recreational and entertainment features. The need for education in the field of astronomy is essential both to involve and interest young people in this dynamic field and to create an awareness of pressing environmental matters. This project is therefor located 600m outside Sutherland and forms part of the Public Outreach Programme of the SAAO.

SOUTH AFRICAN ASTRONOMICAL OBSERVATORY

Science Education/Visitor Centres

A Science Education/Visitor Centre will be constructed at Sutherland as a key feature in the Public Outreach Programme. Funding has to be raised for this Visitor Centre, independent of the SALT contribution by government.

Key features of this Centre will include the following:

- This Visitor Centre will contain interactive hands-on displays on astronomy and other scientific aspects related to the Sutherland / Karoo region.

-For operational reasons, the Visitor Centre will be in a separate building from SALT, but the SALT telescope dome will incorporate a special viewing gallery where visitors will be able to see the full scale of the telescope.

-The potential for increased tourism and educational opportunities in the Northern Cape Province is substantial. The Visitor Centre and its programmes will be advertised widely, and tour groups will be encouraged, with special emphasis on groups of school children. At times the Visitor Centre will also be open to the public at night to allow them to view the beauty of the southern skies through small telescopes. These projected activities all provide development opportunities for the educational and business sectors of the Sutherland community.

-The Visitor Centre can be thought of as a "Stargate" - a gateway to the stars - which will give the South African public and youth an appreciation of the Universe within which we all live. It will also engender a source of pride in South Africa's contribution to this knowledge, and stimulate an interest in science and technology.

In support of the Visitor Centre in Sutherland, the SAAO plans to establish an astronomy gallery in an Interactive Science Centre to be built in Cape Town. This will be a key 'Edutainment' destination in Cape Town and will have an internet link to the Sutherland Visitor Centre. To cater for the growing public interest in viewing the night sky in Cape Town, facilities at SAAO Cape Town will be expanded to allow larger groups of visitors to be accommodated. These facilities will have the advantage of being close to a major population centre.

Payoffs: Same as for 4.3, but in addition: Development of science and technology infrastructure in Northern Cape, and increasing edu-tourism and educational facilities in Northern Cape.

Figure 2: Extract from http://www.saao.ac.za/public-info/salt-collateral-benefits (2011)

4. Client

- National Research Foundation NRF (research)
- South African Astronomical Observatory SAAO (running & development)
- Department of Science and Technology (funding)
- Square Kilometer Array (SKA) committee (funding/research)
- Karoo Hoogland Municipality (site & infrastructure)

5. User Profile

- School groups/tours
- General public
- Local and international Tourists
- Amateur Astronomers
- University of Cape Town research teams

Figure 5: Showing growing number of visitors.
Data from National Research Foundation (NRF)

Figure 3: The Cambridge solar physicist Helen Mason accompanied a group of UK students and their teachers to South Africa, where they worked with several schools and visited the South African Large Telescope (SALT).

Figure 4: American school group in Sutherland

6. The science of the Square Kilometer Array Telescope

The SKA will give astronomers insight into the formation and evolution of the first stars and galaxies after the Big Bang, the role of cosmic magnetism, the nature of gravity, and possibly life beyond Earth. If history is any guide, the SKA will make many more discoveries than we can imagine today.

Radio astronomy has produced some of the greatest discoveries of the 20th century. Central to these discoveries have been innovations in technology pushing the observational frontiers of sensitivity as well as spatial, temporal and spectral resolution. One such innovation in technology – radio interferometry – was awarded a Nobel Prize for Physics. The SKA will carry on this tradition of innovation by combining fundamental developments in radio frequency technology, information technology and high-performance computing.

The SKA will be the world's premier imaging and surveying telescope with a combination of unprecedented versatility and sensitivity that will open up new windows of discovery.

Figure 6: The sky seen at optical wavelengths.

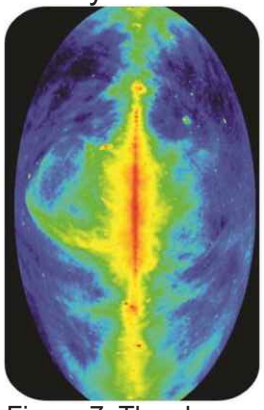

Figure 7: The sky seen at radio frequency of 408MHz.

Figure 8: The sky seen at the frequency of emission of neutral hydrogen of 1420 MHz.

Figure 9: Artist impression of one receiver showing scale

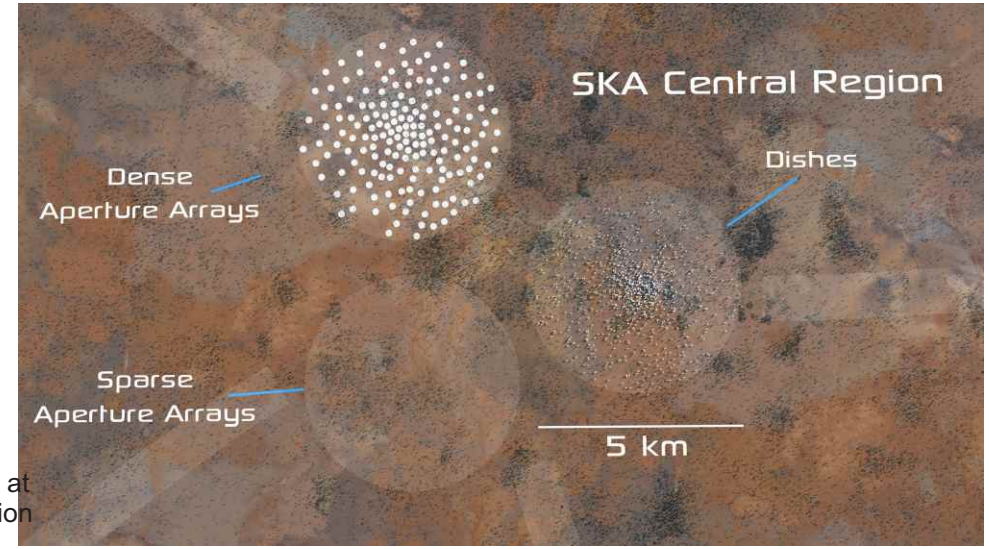

Figure 10: Site plan showing layout of proposed SKA

Figure 11: SALT at night, showing how bright the stars really are.

Figure 12: Southern African Large Telescope (SALT) 10am May 2011

theoretical *[investigation]*