The CENTRE for EARTH & SPACE

Photo: Evert Kleynhans

T: +27(0)51 401 2924 | hoffmamj@ufs.ac.za | **www.ufs.ac.za**

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UNIVERSITY OF THE FREE STATE
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UFS·UV
NATURAL AND AGRICULTURAL SCIENCES
NATUUR- EN LANDBOUWETENSKAPPE

Contents

1. Introduction: Two observatories at the UFS

Properly speaking, we should refer to Bloemfontein as the City of Stars and Roses because we are one of very few cities in the world to have two astronomical observatories. One of these is Boyden Observatory – located about 26 km north-east of Bloemfontein – and the other is the Lamont-Hussey Observatory on Naval Hill in the centre of the city.

The UFS has managed the Boyden Observatory since 1976 when Harvard University donated the site, buildings and instruments to the UFS. Boyden is an active research and educational facility and one of the most accessible astronomical observatories in the world. Bloemfontein's second observatory, the Lamont-Hussey Observatory, belonged to the University of Michigan before it was donated to the municipal authorities in the 1970s. For some time, the buildings were used as a popular theatre venue, but they fell into disuse in the early 2000s. The campaign to establish a digital planetarium within a Centre for Earth and Space resulted in the transfer of the Lamont-Hussey Observatory to the UFS in March 2013. A 35-year concession agreement between the UFS and the municipal authorities (Mangaung Metropolitan Municipality) formalised the transfer.

The UFS thus became responsible for both the Boyden Observatory and the Lamont Hussey Observatory and the 'Two Observatories Project' is now one of the University's unique ongoing initiatives.

Thanks partly to the involvement of the UFS with the Boyden Observatory, considerable astrophysics expertise has developed within the Physics Department at the UFS. The UFS with its two observatories – one of which is now a planetarium – is a key player and respected participant in South Africa's high profile contribution to international astronomy.

2. The Centre for Earth and Space and the Planetarium: background to the project

Throughout the world, approximately 3 000 planetariums offer shows to more than 100 million people per year. Several hundred of these already make use of full dome digital projection technologies. Pre-recorded planetarium presentations are available about a wide range of disciplines including nanotechnology, the environmental sciences and especially, astronomy. Astronomy is a gateway science with links to mathematics, biology, chemistry, geology and physics, and is ideally suited to promoting the knowledge economy in an interesting and accessible manner.

Because digital planetarium technology enables a 3-D immersive full dome experience, spatial concepts such as the structure of molecules, the earth's magnetic field or the large scale structure of the Universe can be illustrated in a very effective way, saving hours of explanation in the classroom. All digital planetariums come equipped with a database, the Digital Universe, which was produced by the American Museum of Natural History. It is regularly updated with the newest scientific information on the Universe. This allows a presenter to 'fly' the audience from anywhere to anywhere via anywhere! The combination of live planetarium shows and pre-recorded shows means that planetarium events are interactive and are easily customised to suit the audience. The technology allows for versatility in the content presented; that is, we use the planetarium for communication on many topics, including astronomy.

For many years, the UFS dreamt of having a digital planetarium in central South Africa. Initially, the project was earmarked for Boyden Observatory, but after discussions, the Free State Department of Economic Development, Tourism and Environmental Affairs (DETEA) suggested it should be located at the unused Lamont-Hussey Observatory on Naval Hill. The location was ideal because the existing telescope building could easily be converted to house a planetarium and would result in reduced construction expenses. Naval Hill is accessible to school learners and the general public, and the planetarium contributes to the revitalisation of Naval Hill and its game reserve.

A master plan for the Centre for Earth and Space was developed for Naval Hill with the planetarium as the first phase of the facility. The expanded concept is a multipurpose facility that promotes science education and communication as its primary function, with education on the environment and conservation, the promotion of the arts and the preservation of astronomical heritage as additional functions.

The national Department of Science and Technology (DST) has contributed a substantial amount to the project and funders from the private sector have also made contributions to support the project.

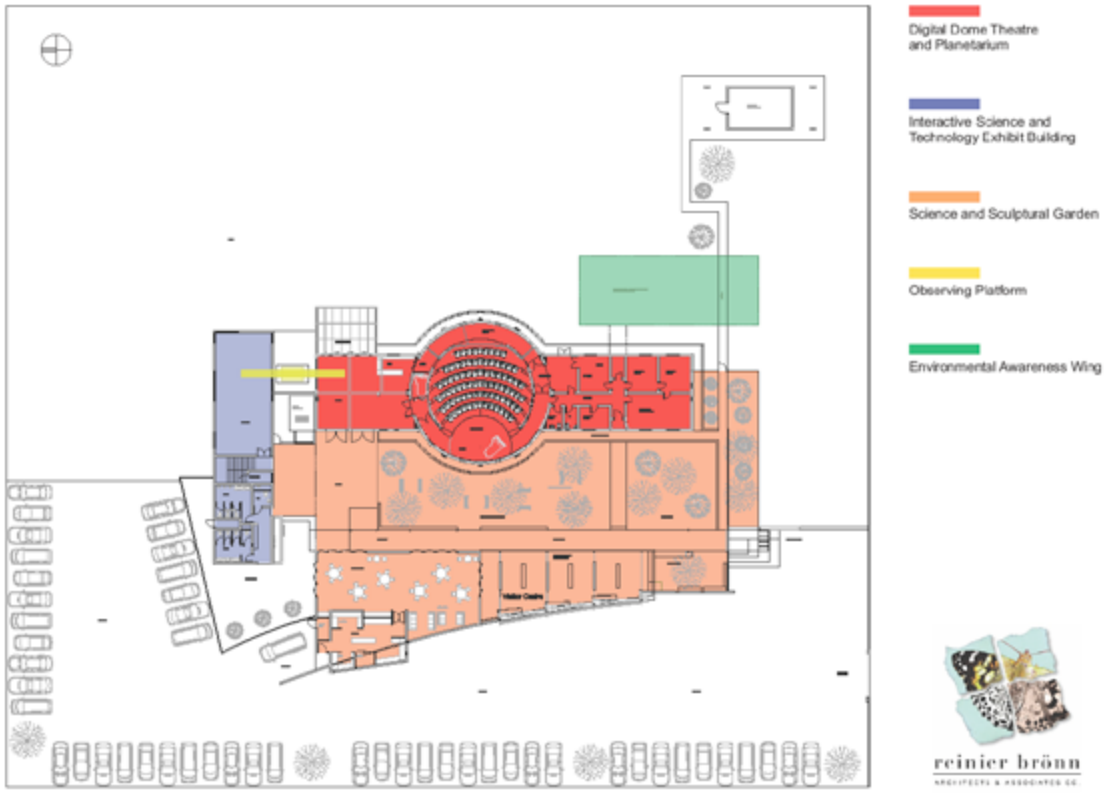
3. Master plan and status of the project

The diagram below shows an architect's sketch indicating the phases of the Centre for Earth and Space.

Phase 1, which includes the planetarium, is shown in red, and is already in fully operational.

Phase 2, the construction of the Environmental Education Hall, shown in green, is currently under way. During this phase, the platform for the reassembly and display of the original Lamont-Hussey Telescope, shown in yellow, will also gain traction although this component of the project is not yet fully funded. The reassembled telescope and its platform are designated as 'Observing Platform' in the diagram.

Phase 3, shown in purple and salmon, includes the planned Art and Sculpture Garden and the Exhibit Building. These components are not yet funded.



4. Benefits of the Centre for Earth and Space

Education: primary and secondary

- The primary beneficiaries of the project are thousands of school learners and their teachers. The UFS already reaches more than 20 000 people per year though programmes and events initially run from Boyden Observatory, which now include the planetarium. We have established robust links with the media and education community throughout the Free State and Northern Cape. The Environmental Education facility will enable us to broaden the reach of the project and address an urgent need among school learners.
- Intensive programmes are presented to special groups throughout the year, including workshops for teachers, the annual Astronomy Quiz, and an annual 'Adventure Camp' for learners with an aptitude for biology, maths and science. The planetarium, with its ability to explain spatial concepts and to address numerous topics, is a formidable new educational tool available to school learners and teachers in central South Africa.

Education: tertiary

- The UFS has gained a reputation for offering quality astrophysics undergraduate and postgraduate degrees. A number of astrophysics students from other countries in Africa are enrolled at the UFS. The UFS is considered a key participant in South Africa's contribution to astronomy. The Centre for Earth and Space helps the university to attract and retain quality science students. The planetarium (and its planned complementary components) allows students to gain skills in compiling and presenting classes, thus preparing them for their roles as teachers and communicators.

Other benefits

- Once completed, the Centre for Earth and Space with its digital planetarium will be an important asset for central

South Africa. It will draw visitors to Bloemfontein and complement existing attractions on Naval Hill such as the game reserve with its spectacular views of the city.

- The Centre for Earth and Space helps to conserve and communicate our heritage, for example, by restoring and displaying the historical Lamont Hussey Telescope.
- The UFS, as the host of South Africa's first digital planetarium facility, shares its experiences and expertise with other organisations wishing to establish similar facilities. In future, South Africa should develop the capacity to compile and produce our own planetarium shows and manufacture planetarium components; after all, we are hosting the largest and most advanced telescope on Earth: the SKA (Square Kilometre Array).
- The Centre for Earth and Space lends momentum to excitement and interest in astronomy in our country.
- The planetarium is a high-technology science visualisation platform. It is not only used by school learners.
- The project is sustainable. Funders from the private sector support the project because of its substantial support base.

5. Funding

Approximately R21 million of the total project budget of R30 million has been received by the end of 2015.

The University's founding funding partners for the project are national, provincial and local government, namely, the Mangaung Metro Municipality (MMM), the Free State Department of Economic Development, Small Business, Tourism and Environmental Affairs (DESTEA), and the DST. Ongoing relationships with the founding partners are maintained to ensure the sustainability of the project.

A number of private local and international funders are also on board, including the American Museum of Natural History and ArcelorMittal. Contributions have been received from the Raubex Group, Sun International, the Old Mutual Foundation, the Hermann Ohlthaver Trust, the Joan St Leger Lindbergh Charitable Trust and the University of Michigan.

6. Conclusion

The digital planetarium, with science communication and education as its core functions, is already an important attraction in central South Africa. The auditorium and its foyer are also used for tourist programmes and as a venue for arts productions and corporate events. As a high-impact resource, the planetarium promotes the knowledge economy to a cross-section of interest groups, including school learners, academia, the astronomy community and the general public.

Planned additions and upgrades will enhance the potential of the Centre for Earth and Space as an educational tool and a tourist attraction. The Centre for Earth and Space is an important and unique resource that promotes science and environmental education and communication, and encourages economic development in th