

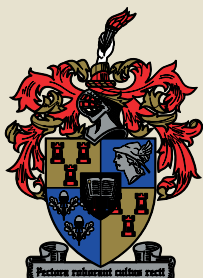
**Vice-Rector: Research, Innovation and  
Postgraduate Studies**

**Report to Council - 2018**

**Prof TE Cloete**

**Viserektor: Navorsing, Innovasie en  
Nagraadse Studies**

**Verslag aan die Raad - 2018**



UNIVERSITEIT  
STELLENBOSCH  
UNIVERSITY

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March 2018

# PROF TE CLOETE, VICE-RECTOR: RESEARCH, INNOVATION AND POSTGRADUATE STUDIES, REPORT TO SENATE

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## INTRODUCTION

**Preamble: The Research, Innovation and Postgraduate Studies portfolio has gone from strength to strength in the past five years, positioning Stellenbosch University (SU) as the leading research-intensive university in South Africa. I attribute this to an incredible team effort. I therefore wish to acknowledge and credit the deans and vice-deans for research, the senior directors in my responsibility centre as well as SU researchers in general for their initiative and dedication. I also appreciate the support of the Rectorate and Council.**

Stellenbosch University (SU) has formulated a vision of establishing itself as a leading research-intensive university on the African continent. It aims to achieve this vision by pursuing excellence and remaining at the forefront of its chosen focal areas, by gaining national and international standing based on its research outputs, by being relevant to the needs of the community, and by being enterprising, innovative and self-renewing.

In order to achieve these objectives, a Research Strategy Framework was developed, which in turn formed the basis for the Research and Innovation Strategy in the office of the Vice-Rector: Research, Innovation and Postgraduate Studies. Creating an enabling environment is vital for research success. Such research enablers include *human resources* and critical mass in terms of *expertise in focus areas*, which is located in centres of excellence and institutes, and is often supported by research chairs. Moreover, universities and research institutions rely on *funding* from contract research to enable further research. In most cases, *infrastructure* is required, including research laboratories that often contain high-end and expensive research equipment. Finally, *collaboration* with other institutions enables training opportunities for postgraduate student support, joint and dual degree opportunities, and the sharing of high-end infrastructure. Primary research outputs include postgraduate qualifications, research publications and patents, and their social impact.

The specific objectives of the research strategy articulated in the Institutional Intent and Strategy (IIS) include the following:

- **The promotion and development of young academic stars**
- **Promoting research outputs and sustaining research excellence**
- **Postgraduate student success**

- **Extending research innovation**
- **The establishment of new research entities/focus areas that will have an impact on the South African National Development Plan**
- **Generating extra third-stream income through contract research**

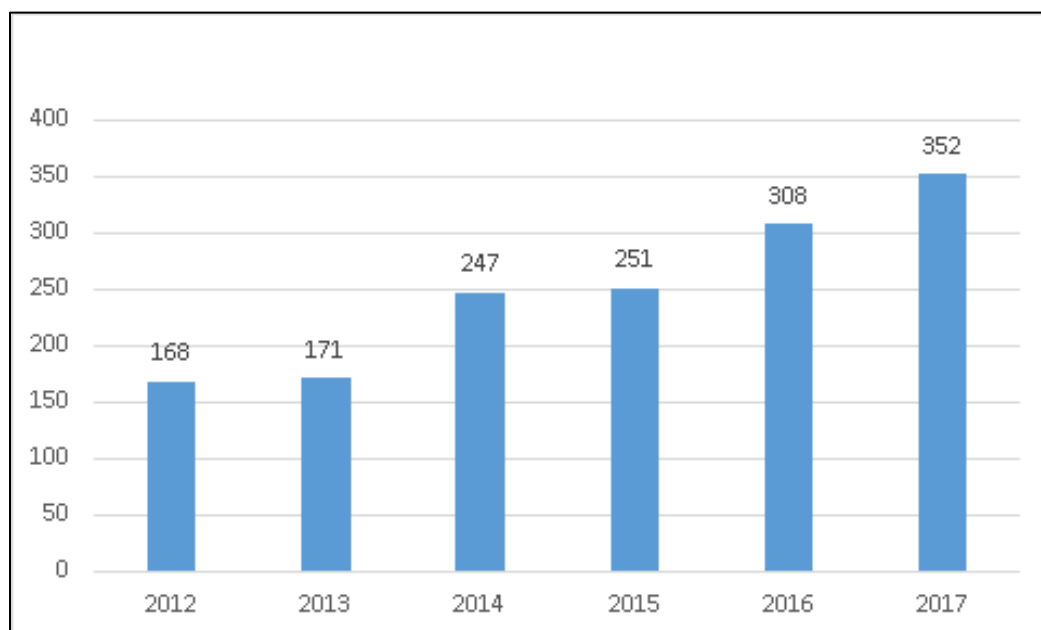
In this review, I will highlight the progress made in each of these areas.

## 1. The Promotion and development of young academic stars

By developing a new generation of academics, the RI&PS RC enhances the University's research capacity, **rejuvenates** the researcher cohort, and fulfils a key role in defending SU against the risk of **slow institutional transformation**.

One way in which this is accomplished is through a structured support programme **for early-career researchers**. Various components of this programme have been implemented over the past seven years. These are further strengthened with funding from the Department of Higher Education and Training's research development grant. The mentorship programme for early-career researchers, which has thus far matched 145 young researchers with experienced research mentors, also continued. This programme equips mentees to develop into established researchers by, amongst others, supporting them through their PhD studies as well as the process of obtaining an official rating from the National Research Foundation (NRF).

Postdoctoral fellows remain a crucial component of our researcher cohort and has a significant impact on SU's research outputs. The number of postdocs registered at Stellenbosch University increased by 40% since 2015 (Figure 1). The first policy for the postdoctoral programme came into effect on 1 January 2017. In November 2017 a highly successful Postdoc Research Day was held which showcased the strides made in research by postdoctoral fellows. A significant risk with this programme relates to human resources. Although the number of fellows more than doubled over five years, and the administrative tasks related to international fellows were transferred to the Division for Research Development from the former International Office, there is still only one person employed to specifically manage the postdoc programme. This office is thus vastly overstretched, and increasing staff capacity should be a strategic priority.



**Figure 1: Postdoctoral fellows at SU, 2012-2017**

The **Consolidoc programme** was introduced in 2013. The objective is to afford PhD graduates an extension following graduation to enable them to publish the research from their theses. More than 50 doctoral graduates have been awarded Consolidoc support since 2013.

Due to the success of the Consolidoc programme, **22 fellowships have been awarded in 2017:**

- 12 in the A environment (Arts and Social Sciences, Economic and Management Sciences, Theology, Education);
- 8 in the B environment (Science, Engineering, AgriSciences); and
- 2 in the C environment (Medicine and Health Sciences).

The 12 Consolidoc fellowships awarded last year resulted in 38 articles at an average of more than three articles per person. Five of these Consolidoc recipients went on to secure postdoctoral fellowships, which they ascribed to the opportunity they had been given to strengthen their CVs and work on the formulation of new research projects.

In the early career programme, Thuthuka, a total of 41 young researchers received Thuthuka awards in 2017 to the total amount of R 2 495 337.

## 2. Promoting research outputs and sustaining research excellence

According to the Department of Higher Education and Training's official report regarding the 2016 publications (assessed in 2017), the weighted research output per full-time SU staff member (both publications and postgraduate students) was 3.11, and its publication output per capita 1.58. This made SU the most research-productive institution nationwide in terms of weighted research output per capita (Table 1). This achievement is also a new record for SU.

**Table 1: SU research outputs, 2012-2017**

Research outputs	2012	2013	2014	2015	2016
Weighted research output per capita	3,08	2,97	3,03	2.92	3.11
Research publication output per capita	1,36	1,47	1,50	1.32	1.58
Ratio of weighted research outputs per full time equivalent teaching and research staff member (SMI)	2,33	2,50	2,53	2.64	2.64

The issue with predatory publishing and the consequences of that on the quality and integrity of research publications poses a challenge to all Higher Education Institutions (HEI's). At SU we strive to act proactively in this regard by raising awareness of this phenomenon and putting measures in place to discourage such behaviour. Several information sessions were held for SU researchers in 2017 to raise awareness of the risks involved.

SU stood firm in a range of **international rankings** and retained its position among the top five institutions in the country. SU has improved its position on the Times Higher Education (THE) World University Rankings. In the 2018 version, which was released on 5 September 2017, SU is now placed **in the 351–400 category**, having moved up from its position in the 401–500 category last year. (SU is still placed third in South Africa, after UCT and Wits.) More than a thousand institutions from 77 countries feature in the rankings, which judge research-intensive universities on their core business – their teaching, research, knowledge transfer, and international outlook. Thirteen calibrated performance indicators are used to provide comparisons. We are particularly pleased with our **improvement in the research section** of this specific ranking. This reflects the University's research status in our country and the rest of the continent. According to figures of South Africa's Department of Higher Education and Training, SU has maintained the highest research output per full-time academic staff member of all universities in the country for the past seven consecutive years. Our improvement on the THE ranking comes after the news in June that SU had risen even further in the QS world university rankings, which now places the University second in South Africa, having climbed from third position in 2016/17 (SU is ranked 361st overall against 395th previously). This improvement was attributed to, among others, the fact that SU boasts the country's highest number of research citations per publication.

SU maintains a **nuanced approach** to university rankings in general – given the current realities of the institution, our country and our continent, as well as the methodology of the various rankings, about which there are well-documented differences of opinion. We do not place too much emphasis on rankings. Academic excellence is non-negotiable, quality always comes first, and no attempt is being made to artificially influence our position on any ranking.

Moreover, the **annual institutional research report**, *Research at Stellenbosch University*, received an excellence award for the sixth consecutive year at the 2017 MACE (Marketing, Advancement and Communication in Education) conference.

These excellent achievements were made possible through the special mechanisms implemented by the RI&PS RC to support and promote research outputs by dedicated and productive staff.

The changing landscape with regard to publication trends set new challenges the past few years around the coordination and finalisation of SU's claim for subsidy of research publication outputs with the DHET. The integrity of the process must be kept above reproach, especially with the increasing prominence of predatory publishers and practices around the appointment of research fellows. The DHET has implemented a **new policy** this year which calls for higher education institutions to provide biographical information of authors and additional documentation required for submissions in the category of books. Furthermore, there has been a steady average increase in the number of articles in accredited journals submitted – in the 2006 output year, SU produced 1 313 articles, and in the 2016 output year this increased to 2 348 (nearly doubled in a decade).

It should be noted that these challenges place pressure on the current capacity available within the Division for Research Development to manage processes around the annual submission of the SU claim for subsidy.

## Sustaining research excellence

- **SU research chairs**

As the following table shows, SU currently has a total of 25 research chairs that form part of the NRF South African Research Chair Initiative (SARChI) and are funded by the Department of Science and Technology. These chairs focus on areas in which SU is regarded a leader. The University also has another 18 chairs funded by other sponsors, six of which were new additions in 2016, namely those of the South African Institute for Chartered Accountants (SAICA), the Competition Commission, the Eskom Power Plant Engineering Institute (EPPEI), the South African National Roads Agency Limited (SANRAL), the Alexander von Humboldt Foundation. Furthermore, SU made available funding from its own budget to create the new chair in Studies in Historical Trauma and Transformation.



**Table 2: SARChI and other sponsored research chairs at SU, 2013-2017**

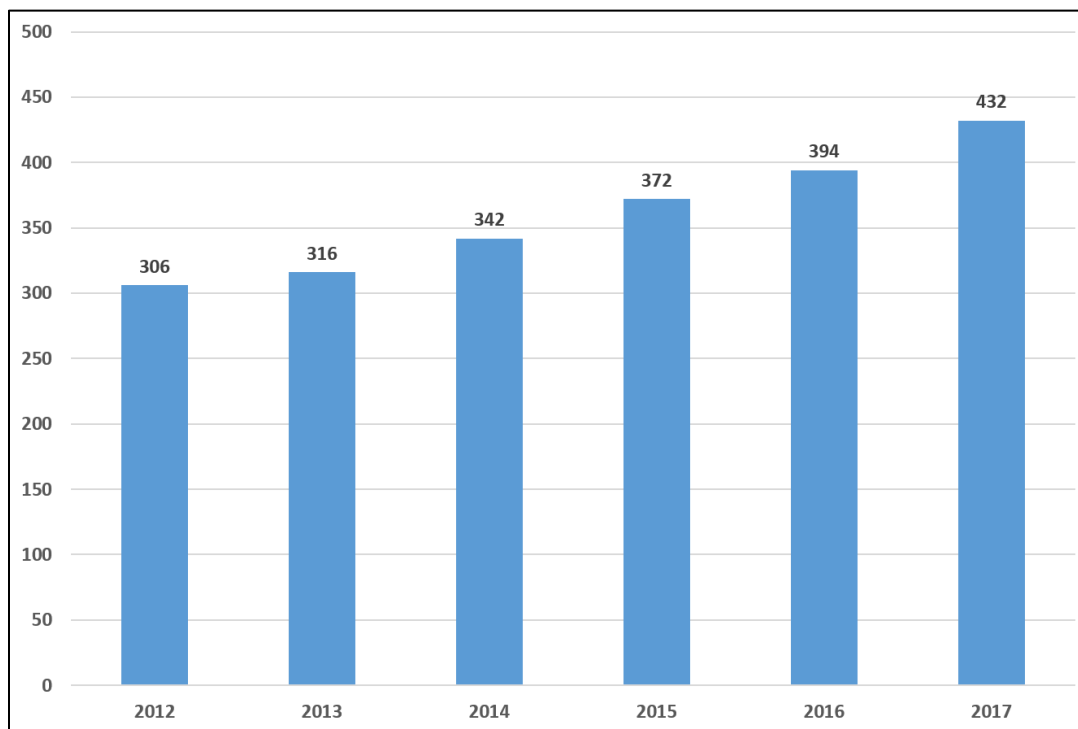
	2013	2014	2015	2016	2017
SARChI research chairs	18	19	24	24	25
Other sponsored research chairs	5	9	11	17	18
<b>TOTAL</b>	<b>23</b>	<b>28</b>	<b>35</b>	<b>41</b>	<b>43</b>

A research chair funded by the multinational beer and beverage company AB InBev has been established in the Department of Agronomy in 2017. The research chair forms part of the company's commitment to achieving Africa's agricultural potential. Four projects will initially be launched under the watchful eye of project leader Prof Nick Kotze.

A new addition is the SA Research Chair programme is one in sugarcane bio-refining, held by Prof Johann Görgens in the Department of Process Engineering. The core of the research chair is to develop better investment opportunities to improve the economic viability of the industry through new technologies and product diversification. Both improvements to existing sugar cane mills, in terms of conversion and energy efficiency, as well as investments in new processing facilities for product diversification, will be addressed through an integrated approach to Sugarcane Biorefining. The combined approach will not only maximise the benefits derived from economies of scale, but also generating new revenue streams from diversifying products with a sufficient cashflow to recover these overall plant investments.

- **NRF rated researchers**

In terms of specialised research capacity, SU has 432 NRF-rated scientists, including 12 A-rated researchers.



**Figure 2: NRF-rated researchers at SU, 2012-2017**

An event was held at STIAS at the end of August 2017 to celebrate our **81 researchers newly rated** by the National Research Foundation (NRF). The NRF rating system is a benchmarking system through which an extensive network of South African and international peer reviewers identify individuals who exemplify the highest standards of research, as well as those demonstrating strong potential as researchers. Ratings are based on the quality and impact of recent research outputs over an eight-year period.

Researchers were notified in 2017 of changes in the **NRF incentive funding scheme** linked to the NRF ratings. These changes were communicated to the joint meeting of Universities South Africa's (USAf) Research and Innovation Strategy Group and the Deputy Vice-Chancellors Forum on 15 September. The changes to incentive funding pose grave concerns to many of our rated researchers who depended on these funds, which were originally secured per year for the period of the NRF rating. This change may have a negative impact on research projects and productivity, as the incentive scheme represented flexible and guaranteed funding for a prolonged period. The fact that the funding is so dramatically reduced may also deter future NRF rating applications.

At SU, we would however like to continue to support the NRF rating system in principle as a qualitative measure of excellence guided by peer review. An NRF rating remains an accomplishment and represents international peer recognition. It potentially has a positive impact on a researcher's reputation, future collaborations and performance appraisals, and will importantly continue to serve as a gateway to certain competitive NRF funding programmes.

The Rectorate (RMT) approved a request for special support (via SU's contingency fund) to NRF-rated researchers in 2018. This is done to buffer the sudden change to the NRF's IFRR programme and to mitigate its negative impact on our NRF-rated researcher cohort in the immediate to short term. It also provides us with time to plan for the future.

Through the contingency fund award, the following support will be provided:

- A once-off top-up in 2018 of NRF incentive funding for SU researchers with an existing rating, or whose rating will be effective from 1 January 2018, in instances where there will be a shortfall between the new NRF amount and the 2017 value. For example, a current B-rated researcher will receive R30,000 from the NRF in 2018, and in addition, will receive R50,000 from SU in 2018, bringing again the total amount for 2018 to R80,000 (the current value).
- As stated in my previous correspondence, although institutional co-funding for Y- and P-rated researchers is no longer required by the NRF the institutional co-funding to these rating categories will continue for the time being to assist our early career NRF-rated researchers. In 2018, the contingency fund award will be added to cover the shortfall between the new NRF amount plus the institutional contribution, and the previous incentive funding value.

In short, SU's NRF-rated researchers can thus work on the premise that they will receive similar levels of NRF rating incentive funding in 2018 than what they would have received under the previous NRF rules.

#### • Awards and accolades

Further testament to the University's eminence in focused research is the range of accolades garnered by its academics. Two of our researchers received **Royal Society of South Africa awards** in 2017: Prof Guy Midgley (Botany and Zoology) is the first recipient of the newly instituted Marloth medal, and Prof Bert Klumperman (Chemistry and Polymer Science) won the 2018 John FW Herschel medal. The fact that the Society honoured two researchers of the same university in one year is truly exceptional and a reflection of their outstanding contributions.

In addition, the following five SU researchers received **membership of the Academy of Science of South Africa (ASSAf)**:

- Prof Cherryl Walker (Sociology and Social Anthropology)
- Prof Leslie Swartz (Psychology)
- Prof Mark Tomlinson (Psychology)
- Prof Ashraf Kagee (Psychology)
- Prof Taryn Young (Epidemiology and Biostatistics)

Stellenbosch University (SU) was represented by a record eight finalists at the **2016/17 National Science and Technology Forum (NSTF)/South32 awards**. Three of the eight finalists competed in more than one category.

The awards recognises, celebrates and rewards excellence in science, engineering, technology and innovation in South Africa. The finalists and the categories in which they have been nominated are as follows:

- Prof Guy Midgley (Botany and Zoology) and Prof Helmut Proding (Mathematical Sciences)
  - *Lifetime award*
- Prof Resia Pretorius (Physiological Sciences)
  - *TW Kambule award for research and its outputs*
  - *Research or engineering capacity development*
- Dr Thorsten Becker (Mechanical and Mechatronic Engineering)
  - *TW Kambule award for emerging researchers*
- Prof Wikus van Niekerk (Centre for Renewable and Sustainable Energy Studies) and Prof Guy Midgley (Botany and Zoology)
  - *NSTF-GreenMatter award*
- Prof Eugene Cloete (Vice-Rector: Research, Innovation and Postgraduate Studies)
  - *NSTF-Water Research Commission (WRC) award*
  - *Research for Innovation award*
- Prof Lingam Pillay (Vulamanz Development Team, Process Engineering)
  - *Research for Innovation award*
- Dorette du Plessis (limbovani Outreach Programme, Centre for Invasion Biology)
  - *Communication award*

Prof Eugene Cloete, Vice-Rector for Research, Innovation and Postgraduate Studies, received an NSTF award for his outstanding contribution to research and innovation in South Africa.

One of Stellenbosch University's top researchers, Prof Resia Pretorius of the Department of Physiological Sciences, was honoured with a **Department of Science and Technology (DST) Women in Science award** in August 2017. Pretorius finished second in the category for distinguished women scientists in natural sciences and engineering. The annual awards ceremony was held in Johannesburg as part of the DST's Women's Month celebrations. The theme for the awards was women's economic empowerment in the changing world of work. Pretorius won the award for her work on how various inflammatory molecules affect red blood cells and blood clotting, as well as the role of these molecules in the development of inflammation.

Our **Division for Research Development (DRD)** has won two national awards for its contribution to research management in Southern Africa. These accolades were handed over at the annual Excellence in Research and Innovation Management awards ceremony of the Department of Science and Technology (DST) and the Southern African Research and Innovation Management Association (SARIMA) in Windhoek on 24 May.

The DRD received the organisational award for excellence in research management, while staff member Ms Aasima Gaffoor was presented with the award for excellence in early-career research management.

The organisational award recognises an institution that is considered a trendsetter in research and innovation management and has managed to build, encourage and champion significant research and innovation within its own ranks over many years.

The award garnered by Ms Gaffoor, in turn, goes to individuals who have been in the profession for less than five years, but have already contributed to the standing of the research or innovation support function of their organisations.

- **Andrew W Mellon Foundation grant for overlooked history**

The trustees of the Andrew W Mellon Foundation have approved a grant of \$860 000 to SU for use over five years in support of a programme using large datasets and digital technologies for historical research. The programme also offers associated graduate training. SU will contribute an additional R1,117 million to the project.

Led by Prof Johan Fourie of the Department of Economics, Faculty of Economic and Management Sciences, the project will be hosted in the Faculty of Arts and Social Sciences' Department of History.

As particularly black South Africans were in the past often excluded from qualitative archival sources, we have a current lack of historical information. Now, individual-level records along with the methods of the “digital humanities” offer an opportunity to tell the untold histories of South Africans. [The Biography of an Uncharted People project](#) is a first attempt to bring to light histories of families that were overlooked in the past. This will be done by transcribing large sets of historical micro-data.

This initiative clearly addresses our institutional strategy with regard to research in the social sciences and humanities, as well as the crucial element of capacity development among young researchers, including those from designated groups. The transdisciplinary project will also support and contribute significantly to the establishment and development of the digital humanities.

Furthermore, the project will initiate and anchor a new methodology in the Department of History. It will have an impact on teaching, learning and research, and open up opportunities for the motivation of future academic appointments in this field.

The Andrew W Mellon Foundation has a longstanding relationship with SU and endeavours to strengthen, promote and defend the contributions of the humanities and the arts to human flourishing and to the well-being of diverse and democratic societies. To this end, the foundation supports exemplary institutions of higher education and culture, as they renew and provide access to an invaluable heritage of ambitious, ground-breaking work.

- **Collaborative study on ‘how SA is being stolen’**

Prof Mark Swilling, co-director of our Centre for Complex Systems in Transition (CST), was the convenor of a collaborative project that made headlines recently with its report, *Betrayal of the promise: How South Africa is being stolen*.

The State Capacity Research Project consists of leading researchers from the universities of Stellenbosch, Cape Town, the Witwatersrand and Johannesburg. It aims to contribute academically to the public debate about ‘state capture’ in our country.

This is an example of the type of **interdisciplinary, inter-university research** in which SU aims to increasingly take part. The CST was established in 2015 as an SU flagship initiative and is co-funded by the National Research Foundation (NRF).

- **Second successful penis transplant**

A team from SU and Tygerberg Hospital has recently performed a second penis transplant, making it the first medical centre in the world to successfully complete this procedure twice.

Prof André van der Merwe, head of the Division of Urology at our Faculty of Medicine and Health Sciences, led the marathon operation of nine and a half hours performed on 21 April at Tygerberg Hospital. The recipient was a 40-year-old male who had lost his penis 17 years ago due to complications after a traditional circumcision.

Microvascular surgery is technically extremely demanding, so the procedure in itself speaks of great **excellence**. Yet, the team also managed to balance compassionate and ethical patient care with the efficient use of scarce resources. And the **relevance** of this intervention in South Africa is great because of complications often caused by traditional circumcision.

The procedure was part of a **proof-of-concept study** to develop a cost-effective penile transplant procedure that could be performed in a typical theatre setting in a South African public-sector hospital. By applying lessons learnt from the first transplant, Van der Merwe and his team were able to significantly cut costs with the second procedure.

In December 2014, Van der Merwe and his team performed the world’s first successful penis transplant. More than two years later, the patient is doing very well, leading a normal life. The world’s second penis transplant was done on 16 May 2016 at the Massachusetts General Hospital in Boston in the US.

- **SU’s third satellite in space**

CubeSpace, an initiative led by Prof Herman Steyn of the Department of Electrical and Electronic Engineering, is still being incubated at SU’s LaunchLab, yet it is already making headlines. Its **ZA-AeroSat satellite**, which weighs just 2 kg, was launched on 18 April with an Atlas V rocket from

Cape Canaveral in the United States. Later that week, the Cygnus module of the rocket docked with the International Space Station (ISS), from where the ZA-AeroSat was released into orbit on 17 May.

The satellite forms part of the international QB50 project, which involves putting 50 satellites, each smaller than a shoebox, into orbit from the ISS to gather data on the largely unexplored lower thermosphere, between 200 km and 400 km above earth.

CubeSpace is currently preparing for incorporation as a formal company in the Innovus group. Its Aerosat satellite is SU's third 'bird' in space (as satellites are sometimes called), following in the trail blazed by **Sunsat** in 1999 and **SumbandilaSat** in 2009.

- **Knowledge Directory opens up SU expertise to the world**

The SU Knowledge Directory aims to increase the visibility of our research expertise. This tool was collaboratively developed by the Division for Research Development, the former Postgraduate and International Office (now SU International and the Postgraduate Office) and the Information Technology Division at SU. The aim is to make information about the expertise of SU researchers more accessible by means of a web console, which is featured prominently on the SU website (direct link: [http://www0.sun.ac.za/knowledge\\_directory/](http://www0.sun.ac.za/knowledge_directory/)).

This directory is valuable for the following reasons:

- Prospective postgraduate students are able to identify possible supervisors.
- It assists in media liaison.
- Potential national and international research collaborators and industry partners are able to search the directory for SU experts.
- It promotes interdisciplinary networking among SU researchers.
- It enhances the visibility of SU's research strengths and individual research expertise.

Currently, it contains only basic information about individual researchers, but does also allow researchers to profile their key areas of expertise. Developments completed in 2017 include short bio-sketches and links to individuals' research publications.

- **Research Ethics**

As argued in the *Policy for Responsible Research Conduct at Stellenbosch University*, good science assumes ethical accountability according to internationally acceptable norms, and the responsibility for this lies with every person conducting research under the auspices of SU. Ethics review at SU is managed through **five committees**: the Health Research Ethics Committees 1 and 2, the Research Ethics Committee: Human Research (Humanities), the Research Ethics Committee: Animal Care and Use, and the Research Ethics Committee: Biosafety and Environmental Ethics (new). The members of these committees are academic staff and community representatives that volunteer their time to assist the University in ensuring that all SU research involving animals, human participants or their private information, or research that can potentially harm the environment, is conducted in an ethically responsible manner.

Since the research activity at SU has intensified in recent years – as reflected in the growth of our research publication outputs, record numbers of master’s and doctoral students graduated, and the growth in the number of research contracts signed – the **number of ethics applications** reviewed by our ethics committees has also **increased significantly**. The number of new applications that served at these committees is reflected in the table below.

Apart from new applications, the committees also deal with continuing review submissions such as progress reports, amendments, protocol deviations, adverse events and final reports. Collectively these submissions are even higher than the number of new applications. It is thus important that the selfless work of these committees is acknowledged and supported.

**Table 3: New applications reviewed by SU ethics committees in the period 2013 to 2017**

Committee	2013	2014	2015	2016	2017
HREC 1&2	453	475	507	470	555
REC: Humanities	425	430	616	882	1285
REC: ACU	32	41	41	50	35
REC: BEE (new committee)	-	-	-	4	2

- **Information provision and library services**

The Library and Information Service (LIS) is an enabler of the University’s core business of research, teaching and learning. To this end, it provides access to high-quality, up-to-date, relevant information resources in either electronic or physical format, the latest tools for discovering information, professional services, and state-of-the-art facilities.

In 2017 the goals of the LIS were [a] to provide and sustain state-of-the-art spaces and technologies that allow users with diverse needs to effectively discover and create knowledge, [b] to develop and sustain skilled, diverse, adaptable and engaged staff, [c] to ensure availability, sustainability and discoverability of information resources, [d] to provide world-class diverse, innovative and client-oriented services and [e] to develop and maintain collaborative relationships with a range of stakeholders.

The extensively refurbished branch library at the Faculty of Medicine and Health Sciences in Tygerberg will open its doors early in 2018. The facility will provide inviting spaces and facilities to accommodate the modern-day needs of medical students, researchers and faculty.

The former JS Gericke Library has been renamed Stellenbosch University Library, contributing to the institutional culture of inclusivity and diversity. Architects for the refurbishment of sections of this building have been appointed, a project which may take up to two years to complete.



The Library upgraded its website and now provides students and staff with a modern, content-rich discovery experience to the full range of library services and information resources. A new-generation library management system and discovery tool has been implemented, ensuring that the Library keeps in step with the latest technology and business processes the academic library industry has to offer.

Two staff members took part in a staff exchange programme with the University of Bath. Research data management, improved bibliometric services and research support to clients were among the topics investigated and subsequently implemented at SU.

A Library staff member participated in a team visit by the International Office to Leipzig University, which already has led to a return invitation with the aim of sharing knowledge about improved service provision.

A Research Data Manager has been appointed in a new post, created with the aim of supporting research data management on campus. Implementation on campus will commence in 2018. The testing of *Figshare*, a bespoke data management system, during 2017 is part of the implementation process.

In order to meet financial challenges and in the interest of a more sustainable subscriptions bill, the LIS has evaluated all existing subscriptions to journals and databases, and has investigated alternatives to subscribing to comprehensive electronic journal packages. This resulted in extensive savings, incorporated into the 2018 budget.

The Library continued with successful activities such as Research Week, Open Access Week and an extensive programme of information literacy training.

Excellent client service is one of the keystones of successful academic library service provision. To this end, the Library has established a library student advisory board, as well as seeking client feedback on white boards. These initiatives have proved to contribute greatly to the provision of quality service.

- **Building ICT capacity and expertise**

The institutional software solutions portfolio in the Information Technology (IT) Division was consolidated and reorganised to more optimally manage the University's substantial software applications. As part of the Council-funded Systems Renewal Programme (SRP), the IT Division completed its re-engineering of the institution's middleware integration and reporting platforms, and is establishing the systems integration capability that will carry a digitally enabled campus into the future. Various software applications that support key SU processes were also implemented or improved, most notably enabling the electronic submission of supporting documents by applicants and the provision of automated, online provisional quotations to prospective international students.

Moreover, the findings of a comprehensive self-evaluation of the institution-wide information and communications technology (ICT) function were externally endorsed, and went on to serve as the basis for the ICT Strategy 2017-2021, which the Rectorate has approved in principle. The enhancements and expansions that will result from this strategy will help SU further protect its unique IT-based institutional processes and data from the risk of insufficient capacity and isolated pockets of expertise.

In terms of meeting the growing demand for network capacity and accessibility, more than 50% of schedulable classrooms have already been equipped with WiFi connectivity, while coverage in academic buildings increased from 30% to 40% in 2016. Central data storage infrastructure was also upgraded.

The learning technology team's efforts to expand ICT support for academic functions included a major emphasis on establishing the video-streaming platform to deliver live lectures and learning content via the internet, as well as strengthening the learning management system and creating support structures – particularly between the IT Division, the computer user areas, the Centre for Learning Technology, and Facilities Management. The emerging ICT in Research Strategy is expected to identify new service requirements, and the current support team's capacity and skills will need to keep pace.

To further enhance SU's hosting architectures, more applications have been migrated to cloud-based platforms, which is in line with global trends. Also looking beyond its own borders, SU formed part of a consortium of Western and Northern Cape universities that submitted a proposal to the Department of Science and Technology for the establishment of a regional data-intensive research facility. This has now been approved with a three-year grant of R30 million, and SU's researchers stand to derive huge benefit from the facility.

### **3. Postgraduate student success**

A substantial and successful postgraduate student body is an important building block of any research-intensive university. SU had 5 005 master's and 1 703 doctoral students in 2017. Of significance is the increase in the number of doctoral students (Table 4).

**Table 4: Number of enrolled master's and PhD students at SU, 2013-2017**

	2013	2014	2015	2016	2017
Master's students	4735	4 717	4 848	4 919	5 005
Doctoral students	1 331	1 385	1 473	1 497	1 703
Total	6 066	6 102	6 321	6 416	6 703

2017 again saw a record number of master's and doctoral degrees conferred during 2017 (Table5).

**Table 5: Master's and doctoral degrees awarded by SU, 2013-2017**

	2013	2014	2015	2016	2017
Doctoral degrees	225	234	267	278	305
Masters degrees	1 301	1 293	1 378	1 391	1598

Mindful of the RI&PS RC's key role as part of the first line of defence against the risk of insufficient student diversity at SU, black, coloured and Indian (BCI) students represented 49% of the postgraduate student body in the year in review, whilst just over 19% of the postgraduate cohort were international.

**Table 6: Postgraduate student diversity, 2013-2017**

	2013	2014	2015	2016	2017
Percentage BCI students	46%	46%	47%	48%	49%
Percentage international students	18,3%	17,8%	19%	19%	19%

The Postgraduate Office (PGO) in the Division for Research Development continues to expand and refine its services for postgraduate students. A comprehensive postgraduate catalogue is now available to assist prospective postgraduate students to review the programme offering. New postgraduates are welcomed and orientation information sessions are conducted across campus.

In the area of postgraduate funding and support, the PGO administered bursaries worth R234 million in 2017 – R12 million more than the previous year. This increase can be attributed to additional bursaries emanating from industry. SU itself contributed R30 million of total postgraduate bursaries.

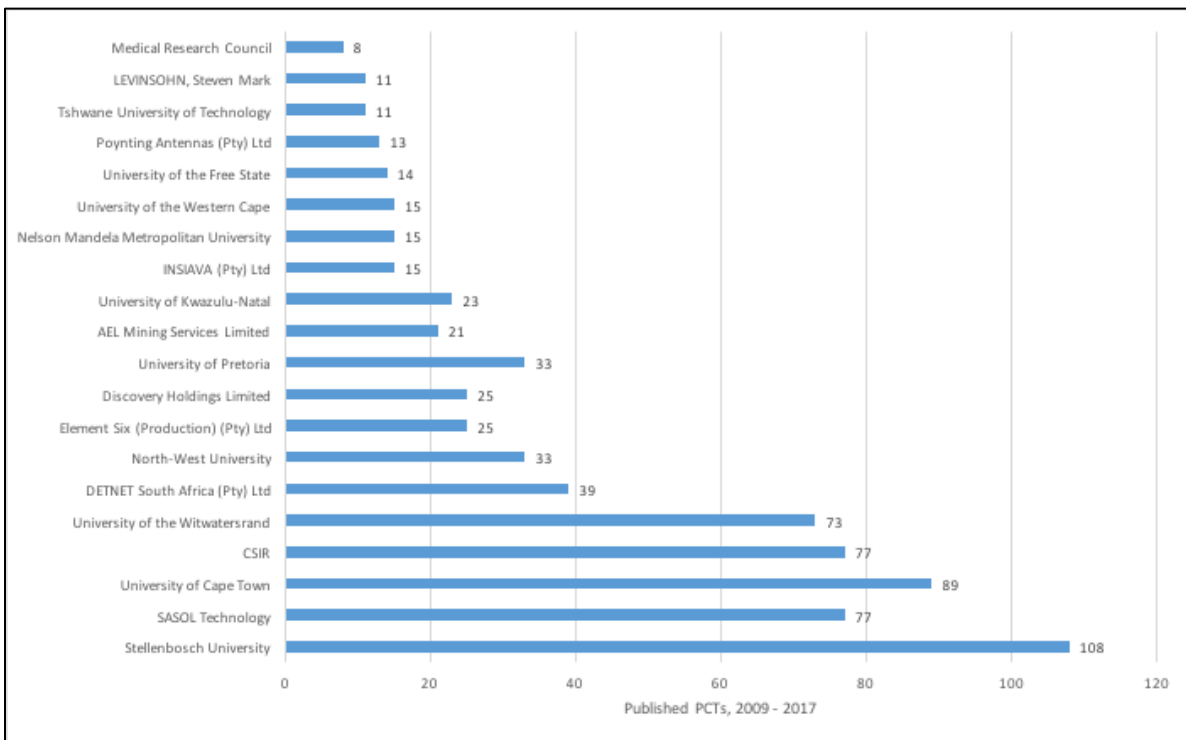
The PGO's Skills Development Programme carried out 20 research support orientations for 1012 postgraduate students across faculties. Research skills development workshops (e.g. on writing theses, dissertations and articles, and MS Word for large documents) reached 1096 participants. In addition, four social events for postgraduate students in the form of Pop up café's took place in 2017. The PGO completed its second year as a partner in an EU Erasmus+ programme called *Enhancing Postgraduate Environments* (EPE). EPE is a collaborative intervention of six South African and six European universities to share expertise to develop a set of South African contextualised resources for

strengthening postgraduate environments. The project's website ([postgradenvironments.com](http://postgradenvironments.com)) was populated with a number of resources in 2017, which can be accessed by individuals or shared during postgraduate training sessions. Tangible outputs produced by the PGO's Skills Development Programme were three e-resources (*How is good scientific writing like good cooking*, *The research degree toolkit*, *The MoU between supervisor and postgraduate students*); and a 2-day intensive training session hosted by the PGO for SU postgraduates, research support staff and academic staff during September 2017, entitled *Supporting Postgraduate Students' Academic Writing*.

The PGO manages the University's joint degree programmes. Enrolments under existing agreements – such as those with KU Leuven and Vrije Universiteit – continue to increase. The resultant steady stream of student movement between SU and its partner universities has proven these programmes sustainable in the long run. Five joint PhD students graduated in December 2017, with a further five candidates graduating in March 2018. New joint degree agreements were concluded with Hamburg University in Germany, Macquarie University in Australia, Coventry University in the United Kingdom, and the Université Claude Bernard Lyon 1 in France. A number of agreements are pending and due to be finalised in 2018.

#### **4. Extending research innovation**

Innovation constitutes a vital component of SU's research success. It positions the University as a place of opportunity, attracting the best researchers and students from across Africa and the rest of the world. A good indicator of the state of innovation is the number of patent applications submitted by SU researchers, as depicted in the figure below:



**Figure 3: Patent Cooperation Treaty (PCT) applications resulting from SU research, 2009-2017**

The fact that SU’s number of PCT applications even exceeds that of the Council for Scientific and Industrial Research (CSIR) is encouraging, and shows that the institution is creating new products and services that may contribute to economic and social improvement in the country. Through the facilitation of SU’s technology transfer company Innovus, various patents were registered and licence agreements concluded for value-added products in the field of agriculture, medicine and technology, to name but a few.

## 5. The establishment of new research entities/focus areas that will have an impact on the South African National Development Plan

### • Strategic research areas

As part of the process of developing a new strategic framework for the University, the Rectorate (RMT) appointed a task team to consider the formulation of strategic research areas or themes for the institution.

The ten-person team did some preparatory work and also consulted widely with all stakeholders across the ten faculties. This took the form of three public forums – two on Stellenbosch campus and one at Tygerberg. The invitation was extended to all SU staff, postdoctoral fellows and postgraduate students interested in providing their inputs. Participants were invited to comment on the approach of

formulating and supporting strategic research areas at SU, as well as what those areas may include and what their titles might be. The forums were well attended, and a final report was submitted to the RMT on 10 October 2017.

Three analogies were used to explain the principles of SU's approach to research themes, namely:

- **Inclusive, broad overarching umbrellas**

These are limited in number and meant to be inclusive and encompass most if not all research that is being done by SU researchers. They are not only broad descriptors of the areas of expertise developed over a number of decades at SU, but are also forward-looking and allow for the development of new expertise over time. They each cover a set of key societal challenges that SU research is addressing.

- **A city where large high-rises exist amongst individual and smaller buildings, as well as roads and public spaces.**

The diverse building blocks of this city contribute greatly to its success and adaptability, and the cityscape may change over time. High-rises are collaborative, trans-disciplinary, cross-faculty research initiatives – the centres and institutes that have and will contribute greatly to SU's visibility, uniqueness, and competitive advantage. It is those areas in which SU has unique experience, critical mass and cross-disciplinary collaborations to bring together large groupings of researchers and non-academic stakeholders to undertake cutting-edge research with high potential for creating new knowledge that will lead to new products, processes and policies.

Individual buildings are an equally important building block of the city and represent strong individual research efforts which contributes to internationally acknowledged research outputs. There will be buildings of many different shapes and sizes between the highest high-rise and the lowest individual building.

Public squares (or play parks) represent physical and/or virtual opportunities created to bring together those individual and smaller/medium-sized research groups who may wish to explore the potential to collaboratively develop new high-rises over time. Roads and transport between all the buildings in the city are essential to facilitate communication and mobility.

- **A fruit tree in which the blossoms and fruit are carried by strong and stable branches.**

This analogy represents SU's competitive strength in the basic and fundamental disciplines and research. Continued emphasis on (and support for) the fundamental disciplines and basic research at SU is imperative in order to acknowledge their critical role in address future societal challenges. While these branches will also grow and change over time, their lifespan will be longer than that of the fruits they carry. Large collaborative cross-faculty research programmes can and should include researchers working in the basic disciplines where appropriate.

Five inclusive overarching (umbrella) areas have been identified to broadly describe and market SU's research at the first level, these five areas are:



**Figure 4: Fundamental basic research**

The purpose of the collaborative research entities is two-fold:

1. At the first level (the analogy of inclusive umbrellas applies) the purpose is to be able to market the full spectrum of SU's existing and emerging research strengths when explaining the SU research portfolio to potential funders, donors, collaborators, post-doctoral fellows and students. This level of information will give the first inkling of SU's strategy, uniqueness and competitive advantage, and will be populated by the detail of existing and new research strengths under each umbrella.
2. At the second level (the analogy of high-rises and public squares in a city) the purpose is the stimulation of new transdisciplinary and cross-faculty research collaboration to form more focused initiatives in order to enrich and strengthen SU's research endeavour. New initiatives created through this process will stand alongside a large number of existing examples. It is at this level where the uniqueness and competitive advantages of SU's research offering will be particularly emphasised.

- **Research Indaba**

The Research Indaba took place on 23 August 2017 at STIAS. The aim of the annual gathering is to provide SU researchers with an opportunity to discuss and voice different opinions around research-related matters. It is important for us to obtain these opinions so that we can determine whether we are on the right track in terms of the support we provide to researchers and postgraduate students, but also for future strategic planning. Researchers find this type of gathering very valuable, and we received very positive feedback. This year, researchers discussed the proposed new strategic research areas for SU, ICT in research, research ethics and integrity, as well as innovation.

## 6. Generating sustainable research income through research partnerships

The strategic objectives of the RI&PS RC include generating sustainable research income through partnerships. Potential sources of research income are contract research (third stream) and philanthropic donations (fourth stream).

Total third-stream income generated through the 885 new research contracts processed in 2017 amounted to R 885 765 504.75, whilst outgoing subcontracts to the value of R23,16 million were signed. This amount is lower than in 2016, however the exchange rate needs to be taken into consideration as the South African Rand strengthened.

Through the Technology and Human Resources for Industry Programme (THRIP), SU's partnerships with industry were further strengthened. Twenty three projects that were funded under the original THRIP programme which was administered by the NRF, received their delayed 2016-17 grants, and a total of R23,3 million was awarded. In addition, the University's industry partners submitted 15 project proposals in reply to the 2017 call of the new THRIP programme which is administered by the Department of Trade and Industry (dti). A total of R22,1 million was eventually awarded to six selected projects. Some of the awarded funding will be used for research and student training activities at different South African Historically Disadvantaged Institutions (HDIs), as required by the dti.

**Table 7: Third-stream income from contract research, 2012-2017**

	2012	2013	2014	2015	2016	2017*
Research contracts	R531,5m	R477,1 m	R585 m	R637,2m	R1,78 bn	R885,8m
NRF/THRIP		R160,3 m	R198,3 m	R224,1m	R367 m	R364,2m
<b>Total</b>	<b>R531,5 m</b>	<b>R703,4 m</b>	<b>R878,9 m</b>	<b>R1,18 bn</b>	<b>R2,158 bn</b>	<b>R1,250m</b>
<b>Released yield</b>	<b>R531,6 m</b>	<b>R669,1 m</b>	<b>R864,2 m</b>	<b>R866,6 m</b>	<b>R1 113,8 m</b>	<b>R1,068m</b>

\* Preliminary figures

- **International funding:**

Through the NRF ca R14 million was awarded to researchers in 2017 to strengthen bi- and multilateral collaboration with various countries, through collaboration and travel grants.

The HB & MJ Thom awarded R1 831 831 towards study leave for academic staff and bursaries for postgraduate students.

The Mellon Foundation awarded Stellenbosch University \$860,000 (R12 660 000) to support the Biography of an Uncharted People project lead by Prof Johan Fourie and hosted by the Department of History.



Through the Research Councils UK programme Global Challenge: Engineering and Physical Sciences Research Council (EPSRC) R3 million was awarded to SU for Prof Gideon Wolfaardt's participation in the project Developing Resilient Nations – Towards a Public Health Early Warning System via Urban Water Profiling (ReNEW).

In the extremely competitive European Union (EU) Horizon 2020 Research and Innovation funding programme as well as other EU-related funding programme, academics across most Faculties applied to a variety of funding programmes. Since Horizon 2020's inception in 2014, SU has been successful in a total number of 51 EU-related projects with a total value of some R169 million. During 2017 only, 15 grants were awarded to a total sum of R37 million. In addition, researchers and students from the University were also involved in 28 Erasmus+ awards to date; these awards include both EU mobility and EU capacity-building programmes. In summary, the overall number of EU related research collaboration awards at the University, including FP7 projects (2007-2013), has now increased to 107.

## CONCLUSIONS

### 1. The promotion and development of young academic stars

**Objective:** To appoint young staff, with the focus on advancing and developing staff as excellent researchers.

It has become clear that SU faces the challenge of an ageing productive scientific community. The expansion of the postdoctoral fellowship programme is a strategic intervention to ensure a solid knowledge base as we move into the future.

#### Highlights

- The focus on postdoctoral fellowships has resulted in an increase in the number of postdoctoral fellows from 168 in 2012 to 352 in 2017.
- The total number of academics rated by the National Research Foundation (NRF) increased from 220 in 2012 to 427 in 2017.

### 2. Promoting research outputs

**Objective:** To continually increase the quantity and especially the quality of research outputs.

#### Highlights

According to the Department of Higher Education and Training's official report regarding the 2016 publications (assessed in 2017), the weighted research output per full-time SU staff member (both publications and postgraduate students) was 3.11, and its publication output per capita 1.58. This made SU the most research-productive institution nationwide in terms of weighted research output per capita (Table 1). This achievement is also a new record for SU.

### 3. Postgraduate student success

**Objective:** To increase the number of postgraduate students to an optimal level across all ethnicities in South Africa and ensure their success.

#### Highlights

- Number of master's degrees (562) awarded during the December graduation ceremonies in 2017
- Record number of doctoral degrees (141) awarded during the December graduation ceremonies in 2017
- Increase in postgraduate student scholarships from R115 million in 2012 to R234 million in 2017
- The highest doctoral student retention and success rate nationally
- 48% black, coloured and Indian (BCI) representation in our postgraduate student cohort
- 19% international representation in our postgraduate student cohort

#### 4. Extending research innovation

**Objective:** To create new products and services that may lead to economic and/or social improvement in the country.

##### Highlights

Since 2015, SU has been the frontrunner in terms of the number of PCT applications (108) it generates. It is pleasing to note that SU's number of PCT applications even exceeds that of the Council for Scientific and Industrial Research (CSIR) and SASOL.

#### 5. The establishment of new research entities/focus areas that will have an impact on the South African National Development Plan

**Objective:** To establish self-funded research entities that will focus on development and implementation to have an impact on the National Development Plan.

##### Highlights

- The number of endowed research chairs increased from 23 in 2013 to 43 in 2017.
- As part of the process of developing a new strategic framework for the University, the Rectorate (RMT) appointed a task team to consider the formulation of strategic research areas or themes for the institution. Five inclusive overarching (umbrella) areas have been identified to broadly describe and market SU's research at the first level, these five areas are:



#### 6. Generating extra third-stream income through contract research

**Objective:** To continue to build a sustainable research enterprise by third-stream income (contract research).

##### Highlights

- Preliminary contract research income was R1,250m.

Yours faithfully

Prof Eugene Cloete

**VICE-RECTOR: RESEARCH, INNOVATION AND POSTGRADUATE STUDIES**