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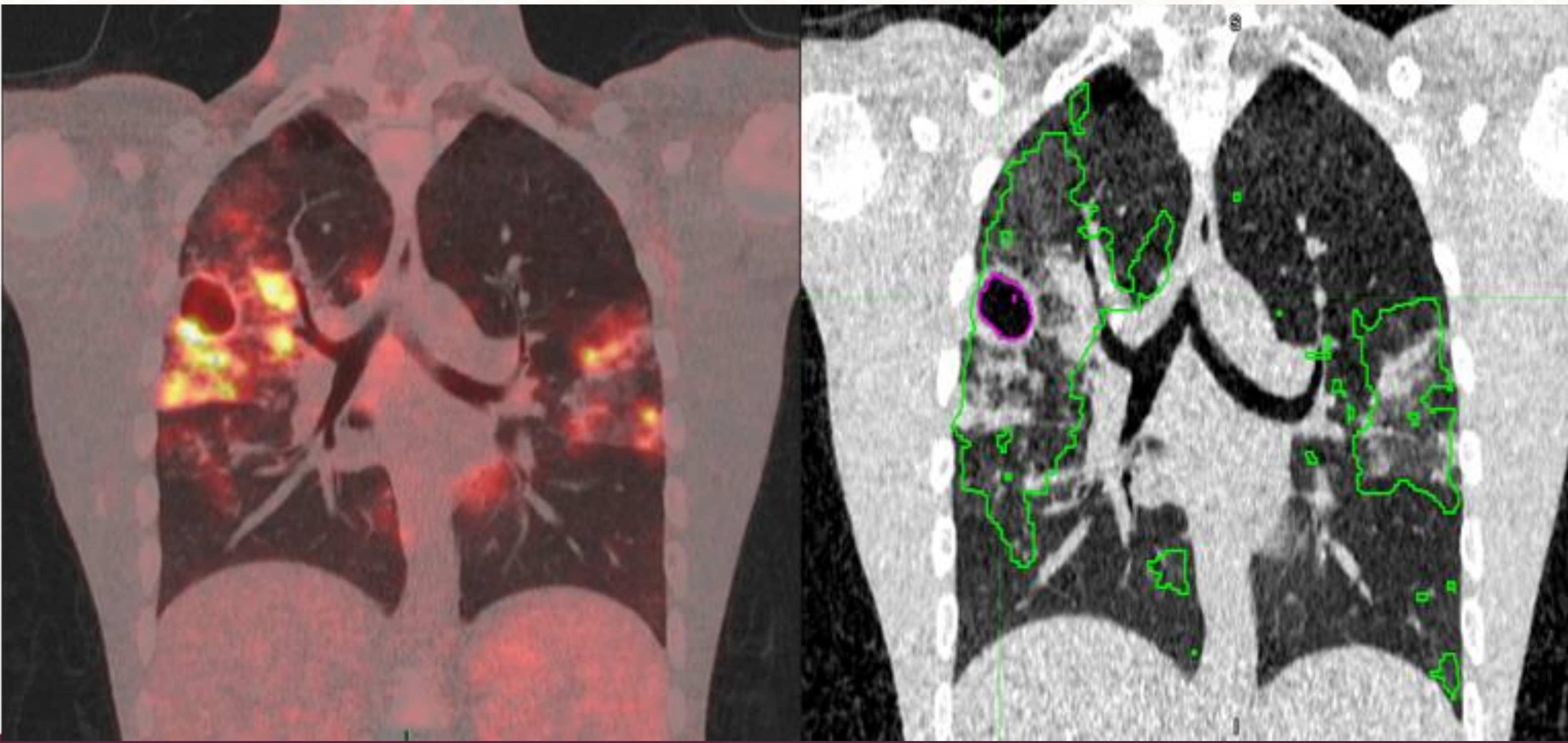
2023/2024 Annual Report *of the* Central Analytical Facilities



forward together
sonke siya phambili
saam vorentoe

Central Analytical Facilities
Stellenbosch University

CAF Committee
2024

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Dr Therina Theron
Ms Malene Fouché (Secretariat)

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Prof Gary Stevens (Director)

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Prof Marina Rautenbach
Prof Gerhard Walzl
Prof James Warwick
Prof Burtram C. Fielding
Prof André van der Merwe

Chair of the BIOGRIP Node steering committee

Dr Suzanne Grenfell

Invited CAF Unit Managers and DSI-funded Node Directors

Dr Marietjie Stander
Mr Carel van Heerden
Dr Janine Colling
Mrs Fransien Kamper
Dr Alex Doruyter
Ms Selina Budhram

Cover Image: Semi-automated quantification of disease burden in an adolescent with pulmonary tuberculosis using F-18 fluorodeoxyglucose PET-C. *Credits: NuMeRI Node for Infection Imaging, Central Analytical Facilities. Reference: Doruyter A, Maasdorp E, Hiemstra A, et al. Baseline PET-CT measures predict lung function at 12 months in adolescents treated for pulmonary tuberculosis. Journal of Nuclear Medicine. 2024;65(supplement 2):241414-241414.*

Contents

2023/2024 Annual Report

Overview

General

CAF income in 2023, excluding income to the financially ringfenced DSI funded nodes was R 50 million, more than double the ~R20 million earned by CAF 10 years ago in 2013. If income to the DSI funded nodes is included, this figure increases to just over R 64 million. Thus, the year-on-year growth of CAF has been considerable, and as will be clear from the discussion below, this has largely been achieved through increasing the amount and value of sales to external clients. Thus, the excellent and comprehensive core facility at Stellenbosch University that CAF represents, is increasing funded by external income. This represents a phenomenal value proposition for Stellenbosch University:

We have a comprehensive, well-functioning core facility and someone else pays for it.

However, the picture is not all that rosy if one looks a little deeper. During 2023 and 2024 CAF has managed to balance costs with income, including, in the 2024 projection, adding R3 million to the reserve for equipment replacement. Income in 2024 is projected to be 10% lower than in 2023, but these mid-year projections are intentionally conservative and come December the gap will likely be much smaller than that. These positive figures hide the fact that several CAF laboratories incurred considerable losses in 2023 and despite some improvements will lose a significant amount of money again in 2024. If this was not so, CAF could be contributing between 4 and 5 million more to equipment replacement. Given the risks posed to the critical research support function of CAF by our aging equipment base, as highlighted in the 2022/23 CAF report, it is essential that the problem of these financially under performing facilities be solved so that CAF can use its full income generating potential to contribute to the renewal of critical equipment.

Achieving cost-effectiveness in all CAF laboratories

During 2023 and 2024 much effort has gone into seeking solutions at the CAF facilities that have historically struggled to break even, including extensive consultation with the relevant internal client base and hiring in an experienced and successful past CAF Unit manager, Dr Angelique Coetzer, to embed herself temporarily in some of the problematic labs to advise on improving the lab's functioning and to help effect solutions. This has gone well, and I believe we have identified workable solutions in most areas. These are as follows:

1) The Neuromechanics Unit has attracted a leading local orthopaedic surgeon and a company based in the USA that manufactures devices that are implanted during surgery to achieve better outcomes for the patient. In combination, they will utilize the motion analysis services of the laboratory to demonstrate the benefits of their procedures and devices. The company will fund MSc and PhD projects aimed a multi-year tracking of patient recovery. This should ensure the sustainability and growth of the Unit.

2) The NMR Unit will achieve cost-effectiveness by staff reduction and continuing to expand the scope of its business in authentication of natural products. The staff reduction will be achieved through normal retirement of a staff member at the end of 2024.

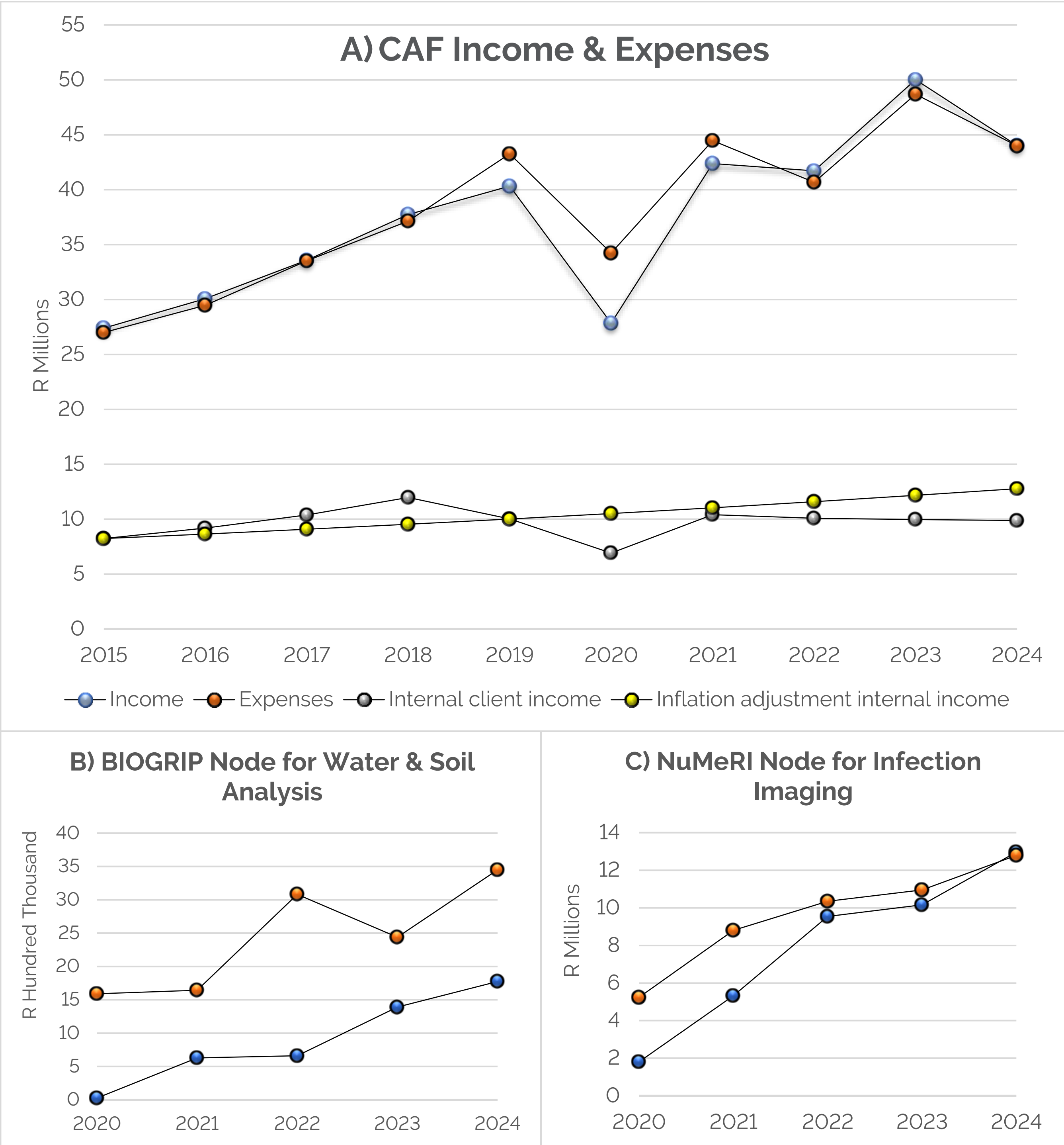

Figure 1: Financial information relevant to CAF operations. A. CAF income and costs for the period 2015 to 2024, excluding income and costs from the DSI funded Nodes, which function as financially ringfenced entities. Note that the 2024 projection of income is likely to be conservative. The financial information for the NII and BIOGRIP Node are illustrated in B. and C. respectively. Note that the NII has achieved cost-effectiveness and there is steady growth in income relative to costs at the BIOGRIP Node. The costs indicated for BIOGRIP include only salaries and running costs. Along with equipment and post-doc costs, these are covered by the DSI grant. Thus, the graph illustrates how close the facility is to being able to function cost-effectively, in a normal service delivery mode, once the period of DSI funding comes to an end. It is essential that we use the opportunity provided by the DSI funding to grow a sustainable biogeochemistry research support structure at SU. Note that CAF income from internal clients has decreased, particularly when considered against inflation. The inflation adjusted projection from 2015 values assumes 5% annual inflation over the whole period. In the period up to 2019 internal client income at CAF grew at a rate greater than inflation. Following the pandemic internal client income has declining significantly in inflation adjusted terms. The reason for this is very likely to be changes to the way the NRF funds post graduate students and a general decline in the value of NRF grant funding available to SU academics in the SET faculties.

3) The X-ray CT Unit will achieve cost effectiveness through the acquisition of new equipment that is cheaper to run than the very old equipment the laboratory currently uses. In the interim staff costs will be shared with the ICP MS unit, which is profitable and where a need for additional staff exists.

4) The Proteomics Mass Spectrometry Laboratory (part of the MS Unit) and the Confocal Microscopy Laboratory (part of the Microscopy Unit) both historically lose a considerable amount of money each year (~ R 800k each). In both cases externally funded laboratories at UCT offer similar services for free. Thus, there are structural reasons why we cannot easily expand the scope of business in both environments. Several possible solutions have been proposed to the different user groups: 1. The equipment could be taken over by the department representing the largest internal client group. This would have HR implications with the relevant CAF positions would become redundant; 2. The relevant faculties could decide to support these services by either purchasing analytical services for their academics who cannot afford to use the laboratories; or, 3. by allocating a post for an analyst to run the laboratory. Discussions with the FoS and FMHS about these options are currently underway. Note that both environments desperately need equipment renewal, and it will soon become impossible to offer these services in any form if we don't renew the equipment. A fundamental decision needs to be taken on whether it is sensible to do so, given the subsidised facilities available at UCT.

The Equipment Renewal Problem

The National Equipment Programme (NEP) of the NRF has in recent years proved to be ineffective in providing for CAF equipment renewal. Consequently, I propose that the full value of the ALE fund for large analytical equipment be made available to CAF in 2026 to 2030 for equipment replacement, using NEP opportunistically wherever possible. These funds will need to be supplemented by CAF profits and a proposed strategic fund contribution to drive a comprehensive program of equipment renewal. SU has 4 NEP applications currently under evaluation and any available ALE funds available after SU co-investment obligations have been met should be available for the equipment renewal programme. The following table lists the equipment priorities and possible funding sources:

	Equipment	CAF	ALE	Strategic Fund	Total
2025	Laser Ablation System Refurb.	R3 000 000			R3 000 000
2026	Proteomics and Pharmacology MS	R3 000 000	R15 000 000	R12 000 000	R30 000 000
2027	X-ray CT Scanner		R15 000 000		R15 000 000
2028	Confocal Microscope	R3 000 000	R15 000 000		R18 000 000
2029	Analytical SEM	R5 000 000	R15 000 000	R3 000 000	R23 000 000
2030	PET CT Scanner	R5 000 000	R15 000 000	R30 000 000	R50 000 000
Totals		**R19 000 000**	**R75 000 000**	**R45 000 000**	**R139 000 000**

Professor Gary Stevens
CAF Director

Profile of the CAF Client Base

Since 2017, CAF has collected comprehensive information on the user base. This enables us to provide our principal equipment funders, the NRF and DSI, with a comprehensive summary of who uses CAF NEP and DSI-funded equipment; whether they are researchers or post graduate students; if the latter, their level of study; institution of origin, etc. Figures 2 - 5 below provide some information on the CAF client base in 2023 as well as on possible changes to the profile of CAF clients over time:

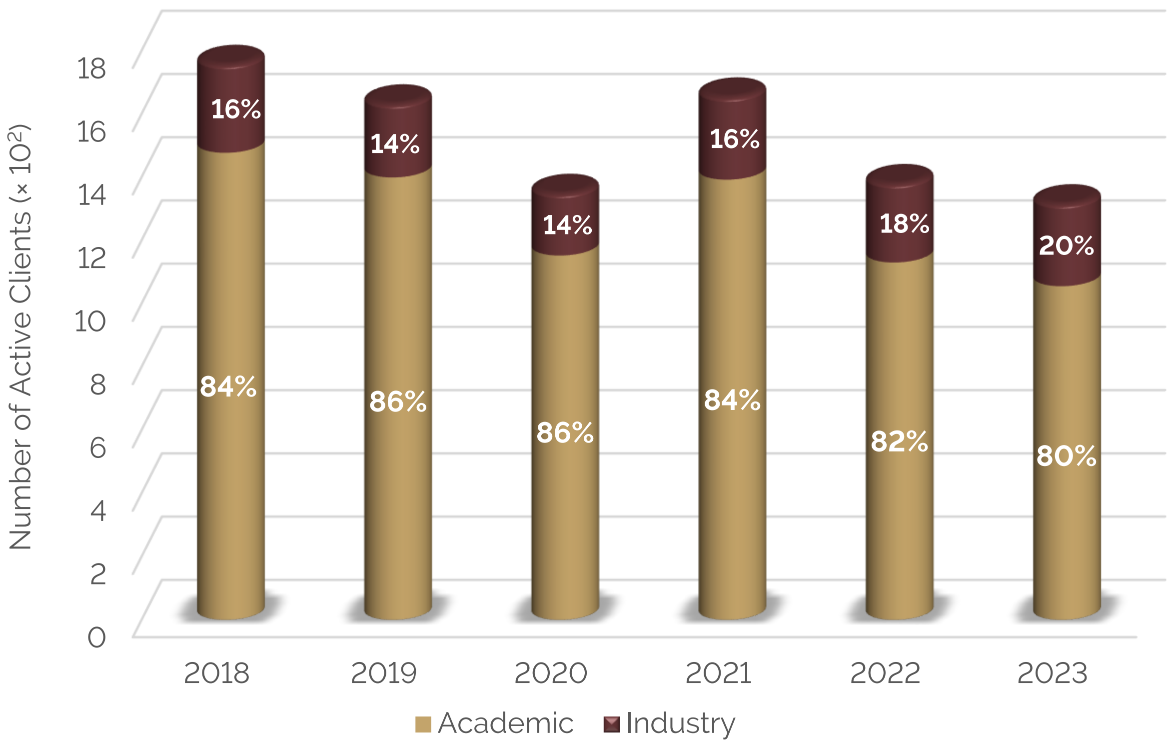

Figure 2: The number of active CAF clients from 2019 to 2023, including the percentage of industry and academic clients. A comparison with Figure 5 indicates that the decrease in client numbers in 2020, 2022 and 2023 is a function of fewer post-graduate student clients in these years.

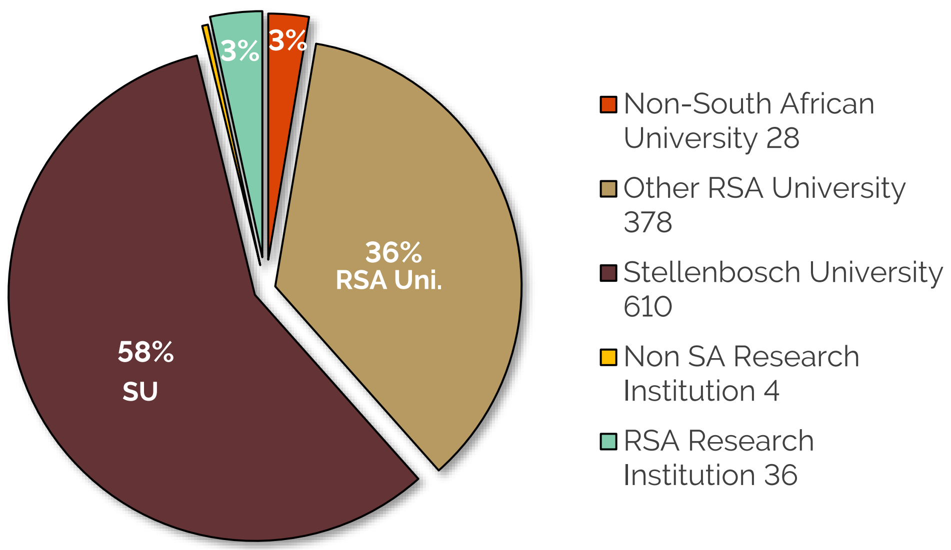

Figure 3: The subdivision of CAF academic clients 2023 (80% of total CAF clients) according to type of institution for 2023.

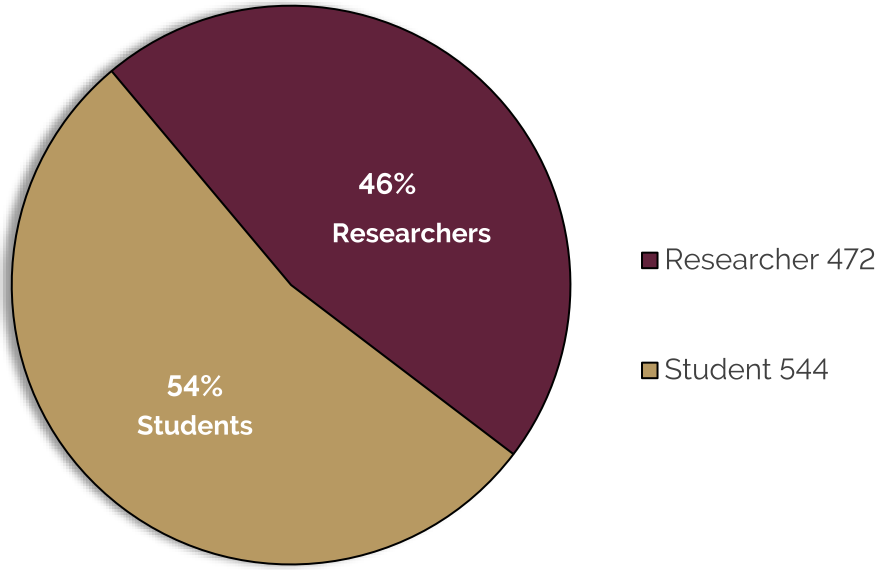

Figure 4: The proportion of post graduate student clients to researcher clients for 2023.

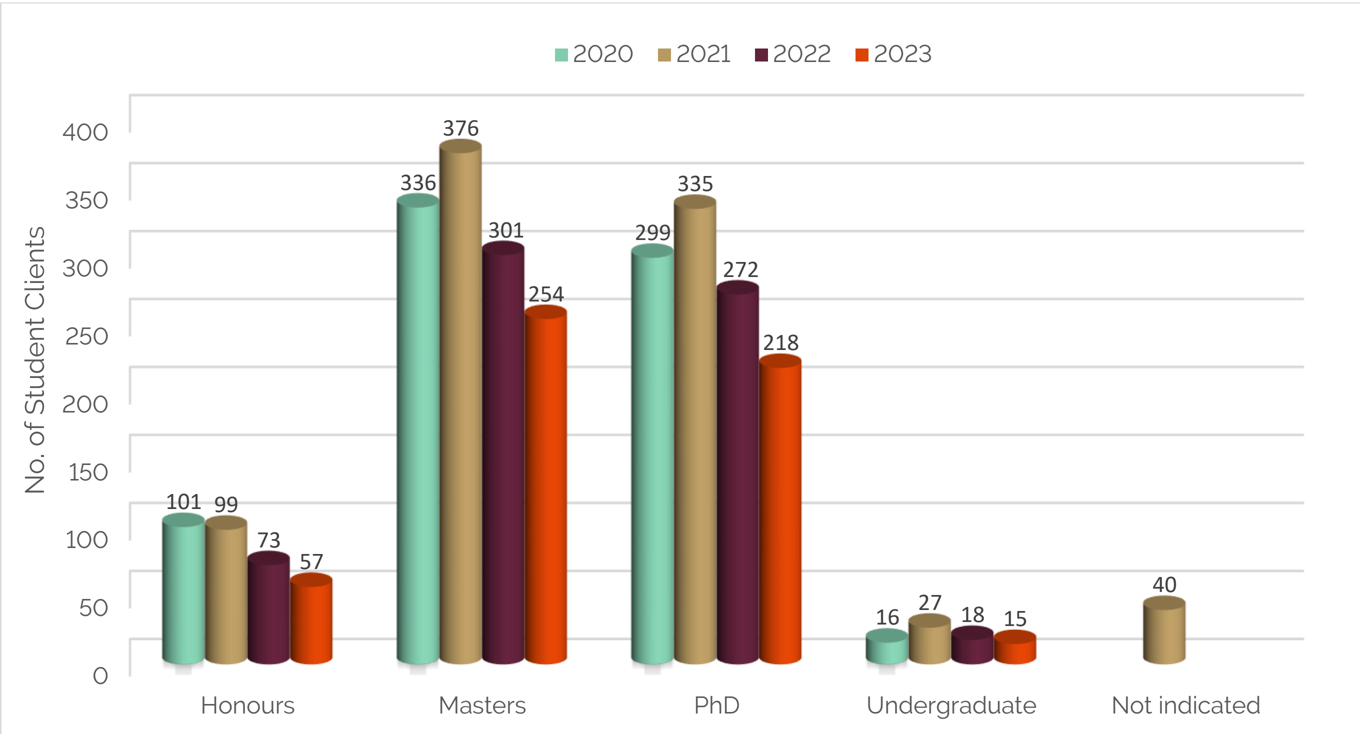

Figure 5: The subdivision of student clients according to their level of study for the 544 (54%) student clients for 2023 compared with the same data for 2020 to 2022. There has been a notable gradual decline in the number of student clients in each category since 2021, mirroring the decrease in CAF internal client income for the same period.

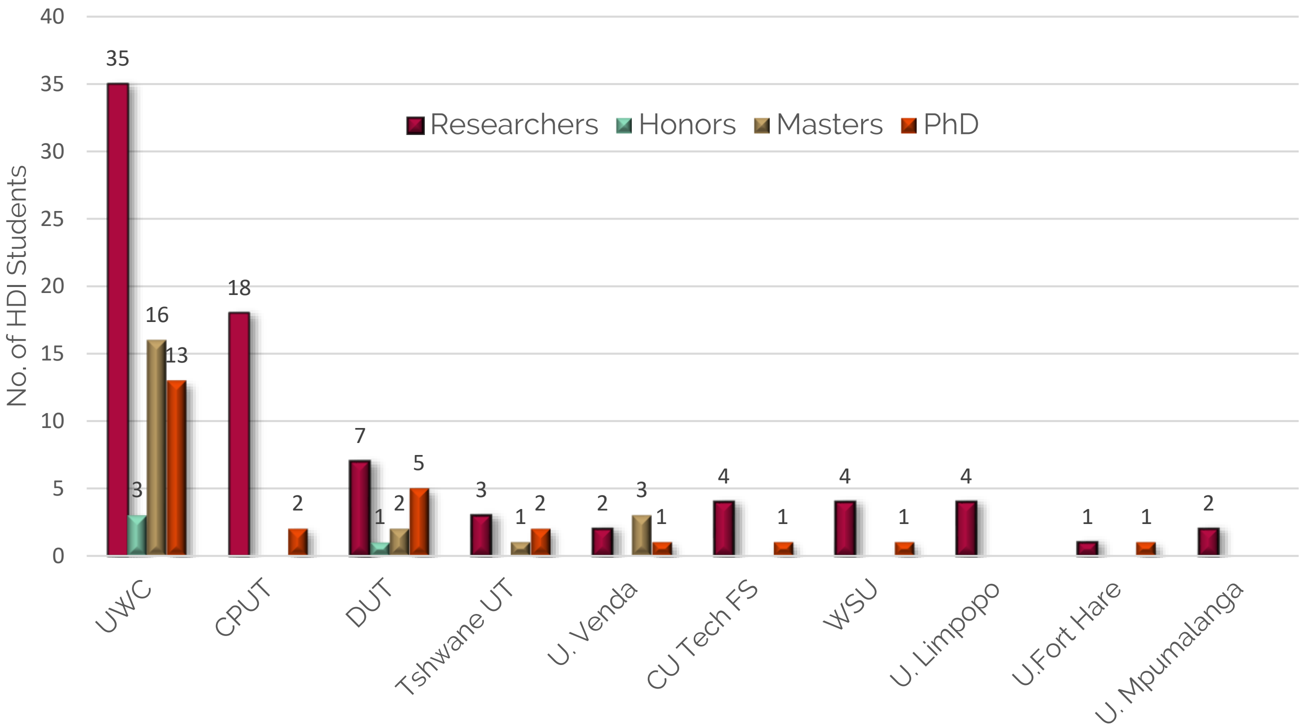

Figure 6: Analysis of the number of users for 2023 from Historically Disadvantaged Universities (HDI) in South Africa. Note that this is a minimum estimate of the students from these institutions who benefit from CAF services and expertise because several students are commonly accommodated under the identity of the supervisor.

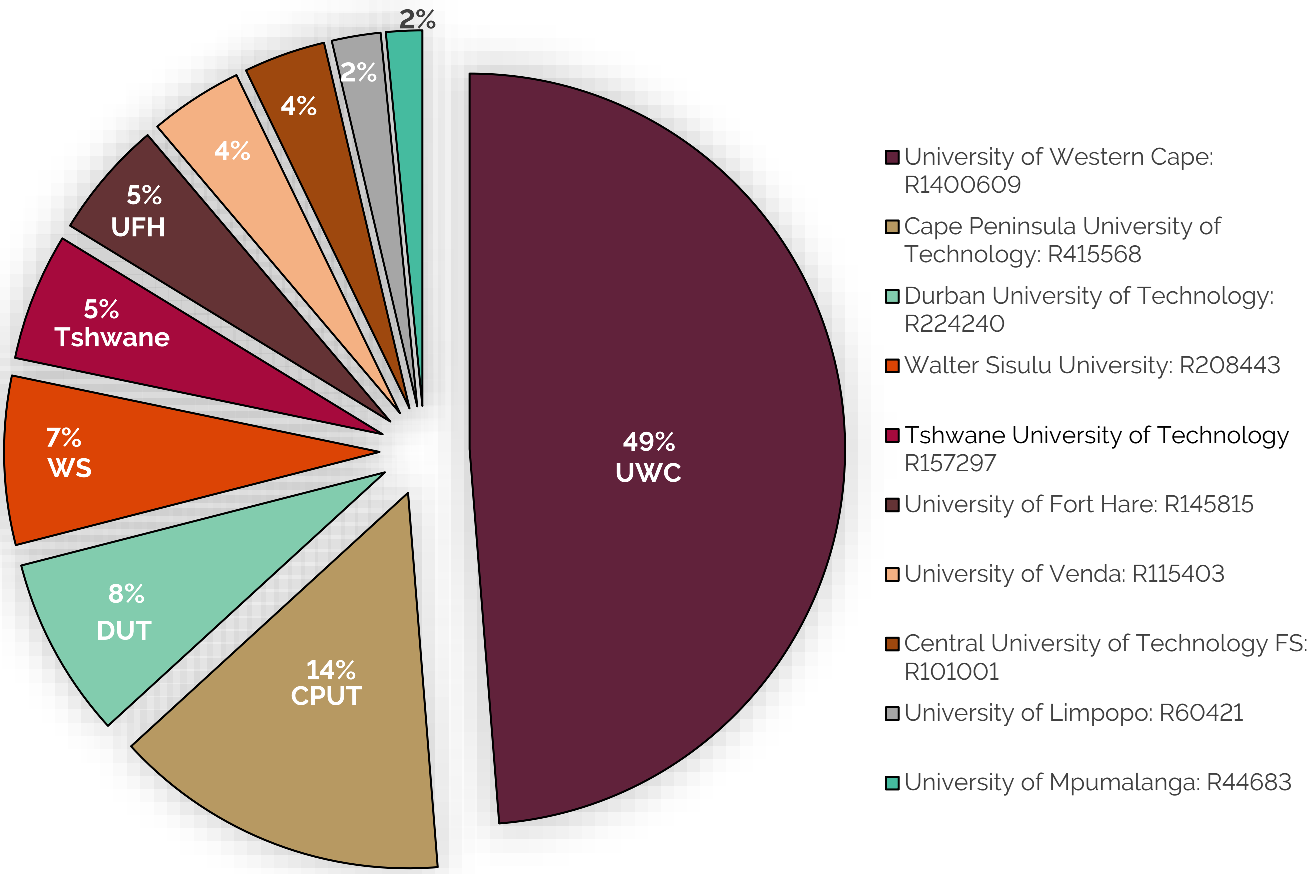

Figure 7: Analysis of the income derived from the different HDI Universities in South Africa for 2023. The total value of services rendered to these universities for 2023 was R2 873 478. The pie graph illustrates the percentage of this income relevant each university.

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2024/25 equipment news: Tandem Multicollector ICP-MS Instrument for Biogeochemical Research

Stellenbosch University is poised to significantly enhance its research capabilities with the acquisition of a state-of-the-art mass spectrometer, the **Thermo Scientific™ Neoma™ MS/MS (Tandem Mass Spectrometry) Multicollector (MC) - Inductively Coupled Plasma Mass Spectrometer (ICP-MS).** This advanced instrument, will revolutionize the precision and scope of isotope analysis at SU and will transform research across multiple disciplines, including geoscience, biology and environmental science. The instrument will form part of the *BIOGRIP Node for Water and Soil Biogeochemistry*, managed by Dr Janine Colling, which is situated at Stellenbosch University (SU) and is managed as part of CAF.

The Neoma MS/MS MC-ICP-MS represents a substantial investment in research infrastructure, reflecting a commitment to advancing scientific understanding and innovation. The acquisition was made possible through a collaborative funding effort: approximately R20 million was provided by the Biogeochemistry Research Infrastructure Platform (BIOGRIP), a South African research initiative funded by the Department of Science and Innovation (DSI). Stellenbosch University contributed the remaining R8 million, demonstrating its dedication to supporting innovative research.

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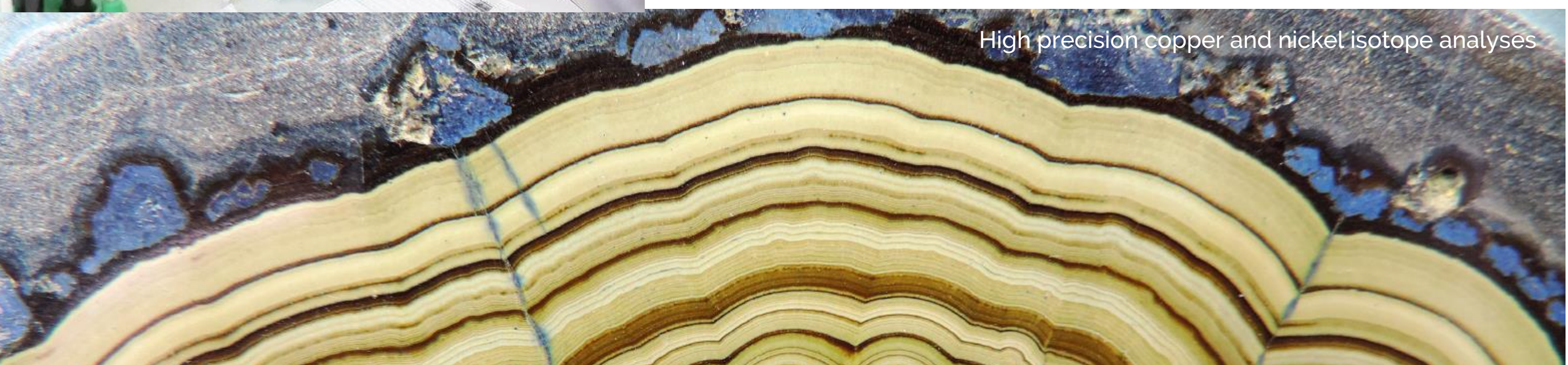
The instrument is expected to arrive in Stellenbosch in March 2025. Initially the facility will be housed in the Chamber of Mines Building, in an extension of the existing CAF ICP-MS laboratory managed by Ms. Riana Rossouw. On completion of the consolidated CAF laboratories to be constructed in the Paul Sauer Building, the Neoma will be relocated there, where the existing BIOGRIP Node for Soil and Water Biogeochemistry is based. The new laboratories will include state-of-the-art clean lab spaces.



High precision copper and nickel isotope analyses

Innovative Technology: Capabilities and Functions

The Thermo Scientific™ Neoma™ MS/MS MC-ICP-MS is a pioneering instrument in the field of mass spectrometry. It introduces several advanced features that set it apart from traditional mass spectrometers:

- **Collision/Reaction Cell Technology:** The first dedicated collision/reaction cell MC-ICP-MS, equipped with unique pre-cell mass filtering technology. This innovation allows for the effective separation of isobaric interferences, which are common in high-precision isotope analysis. The collision/reaction cell can address isobaric interferences that even the highest resolution instruments struggle to resolve.
- **Advanced Analytical Capabilities:** Complex analyses such as in-situ Rb-Sr dating, interference-free Ti isotope analysis, boron isotope analysis of biogenic carbonates, and potassium isotope analysis. These capabilities offer unprecedented accuracy and precision, expanding the potential applications in various research fields.

Unique Applications in Biogeochemical & Geochemical Research

The Neoma MS/MS MC-ICP-MS's advanced features open new avenues for research across diverse fields:

Geology:
The instrument's capabilities in high-precision Rb-Sr dating will revolutionize geological studies, providing insights into the Earth's history with unprecedented accuracy. The ability to separate isobaric interferences enhances the precision of radiometric dating and other geological analyses.

Biology and Environmental Science:
The high-precision isotope analysis is invaluable for understanding biogeochemical processes, such as metal stable isotope fractionation in seawater. This has applications in studying anthropogenic impacts on the environment and tracing biological and chemical processes in natural systems.

Archaeology:
Although still emerging, the high-precision isotopic analysis holds potential for archaeological research. It can be used to analyze artifacts, determine their origin, date materials, and study past environmental conditions.

Marine and Environmental Geochemistry

Although Stellenbosch University has extensive expertise in mass spectrometry, the new multicollector ICP-MS instrument represents a new frontier for the university. This upgrade will build upon the expertise developed by Prof. Alakendra Roychoudhury in the Department of Earth Sciences. Prof. Roychoudhury, a renowned Professor of Marine and Environmental Biogeochemistry, has significantly advanced South Africa's research capabilities in open ocean trace metal biogeochemistry. The capabilities of the new multicollector allow the analysis of additional metal stable isotopes with high precision and no interference due to its pre-mass filter. This will deepen our understanding of anthropogenic impacts on the environment and further elucidate biogeochemical processes such as redox transformations and biological cycling. The advanced features of the Neoma will also facilitate research into mass-dependent versus mass-independent isotope behavior and isotope compositional variability, which are crucial for advancing the field of marine and environmental biogeochemistry. The new instrument will facilitate groundbreaking research that addresses local and national challenges. Its applications will contribute to a deeper understanding of environmental changes, enhance water and soil management, and support advancements in health and well-being.

Radiogenic Isotope Dating & Geochemical Trace Elements

Prof. Cristiano Lana, a leading expert in Laser Ablation ICP-MS and trace element isotope geochemistry, will manage the Neoma instrument. His extensive experience in multi-collector analysis of isotopes and trace elements, including developing novel new analytical methods, aligns perfectly with the Neoma's advanced features. Prof. Lana's recruitment was significantly influenced by Stellenbosch University's commitment to innovative research. His distinguished record building and managing the Applied Isotope Research Laboratory at the Federal University of Ouro Preto, in Brazil, will be invaluable in maximizing the Neoma's potential and driving forward innovative research.

High precision in-situ Rb-Sr dating

SU Academic Cyclotron Project: An Update

The SU Academic Cyclotron Project was formally registered by Facilities Management on 22 November 2023. By the end of July 2024, the project was in the latter stages of the pre-feasibility and concept design phase when it was placed on hold. This pause was necessary due to the private partner's failure to provide required specification and design details and their inability to commit to the proposed scopes of responsibility, which were essential for progressing to the design development phase.

In discussions with the private partner, it has become evident that they will now likely commission their own cyclotron facility at an industrial site nearby. The proximity of this site is expected to still benefit SU while at the same time alleviating several regulatory challenges associated with an on-site, shared facility.

CAF is exploring several options to ensure that the cyclotron project achieves most of its original objectives despite this development. The currently preferred strategy, that must still be approved by the Bill & Melinda Gates Foundation and the provincial government, is to upgrade the existing PET radiopharmacy at the Node for Infection Imaging (NII) situated on the Tygerberg Hospital Estate. Improvements to air-handling, workspaces, and equipment would better align the NII radiopharmacy with GMP/GMCP standards and would facilitate its registration with the South African Pharmacy Council as a community/compounding pharmacy. As originally intended, the result would be a high-quality academic radiopharmacy, capable of its own radiosyntheses and with the regulatory standing to support clinical trial research. Such an investment would further strengthen SU's partnership with the provincial government to improve health outcomes and would improve the University's capacity to train radiopharmacy students in a clinical setting.

Winter Schools

From July 15 to 18, 2024, Stellenbosch University's (SU) Central Analytical Facilities (CAF) hosted two impactful winter schools for postgraduate students. these events aimed to attract exceptional students to SU, particularly from Historically Disadvantaged Institutions (HDIs), while showcasing the University's analytical resources and encouraging future postgraduate registrations. The winter schools cost a combined amount of R158,688.

1. Biomedical School: Analytical Tools for Biomedical Sciences

This winter school, organized by the Microscopy and Flow Cytometry Units, was held over two days at the Biomedical Research Institute (BMRI) on the Tygerberg Campus and one day at the Stellenbosch Campus. It focused on advanced biomedical imaging techniques and flow cytometry, targeting students and postgraduates in Physiology, Molecular Biology, and Pharmacology. The event saw 15 attendees, including 3 from HDIs, 6 from outside SU, and 6 from SU. It also provided six flight grants and seven accommodation grants. Additionally, 17 more students participated online from various African countries and Iran.

2. Biomechanics School: Quantifying Movement in Engineering, Sports Science & Medicine

Hosted by the Neuromechanics Unit at the Coetzenburg Sports Complex, this winter school catered to students in Engineering, Sport Science, and Medicine. It provided intensive training in biomechanical assessment techniques over three days. Six students attended, with one flight grant and five accommodation grants awarded.

A notable outcome was the strong interest in postgraduate programs at Stellenbosch University. One student has registered for MSc degree with Prof. Pretorious and several students have expressed plans to apply for programs in 2025 with academic presenters at the winter school, including students from Venda University, Durban University of Technology, University of Pretoria and University of the Free State.

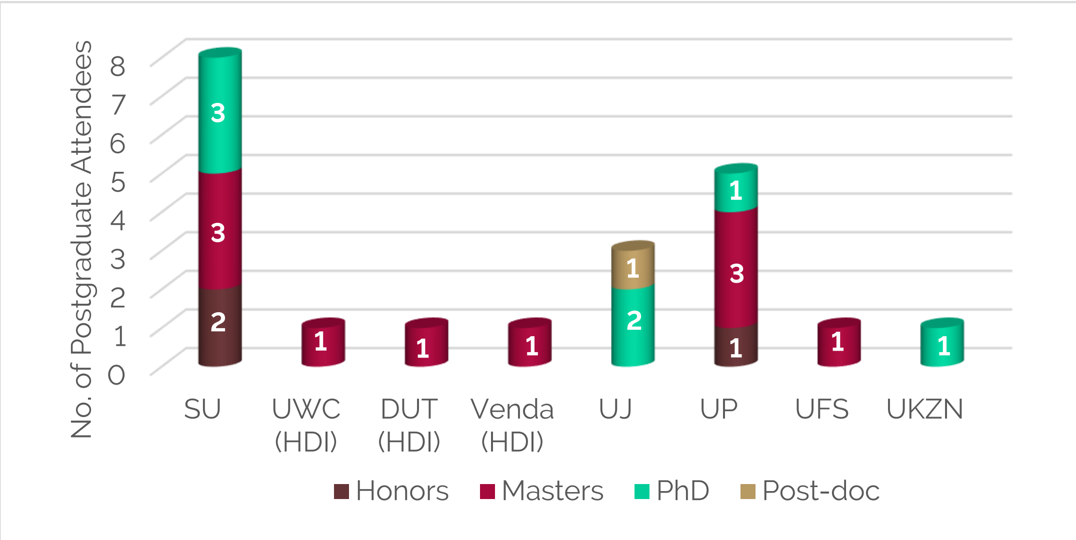


Figure 9: Representation of the postgraduate student attendees of the CAF winter schools held in July 2024 by university and degree level. HDI-Historically Disadvantaged Institution); SU- Stellenbosch University; DUT-Durban University of Technology; UJ--University of Johannesburg; UP-University of Pretoria; UFS-University of the Free State; UKZN-University of Kwazulu-Natal.

Financial Reports

		2021	2022	2023	Projection 2024
MS Unit	Internal Invoicing	1 599 311	1 731 444	1 487 985	1 601 331
	External Invoicing	7 971 178	7 803 460	8 500 394	8 679 389
	Total logbook income	**9 570 489**	**9 534 904**	**9 988 379**	**10 280 720**
	Salaries	4 521 704	4 548 745	4 758 594	4 597 535
	ICR	1 618 314	1 542 253	1 700 079	1 735 878
	Running costs	1 083 715	1 133 629	756 131	1 234 697
	Maintenance	375 552	1 064 626	489 265	408 332
	Travel Costs				
	Small equipment & KKW	71 415	92 020	32 380	67 353
	Deferred Costs	399 996	439 992	827 723	833 279
	Total Expenses	**8 070 697**	**8 821 265**	**8 564 172**	**8 984 446**
FM Unit From 2022 Flow Cytometry Unit	Internal Invoicing	1 407 422	576 163	807 630	936 891
	External Invoicing	78 438	27 708	20 247	38 536
	Total logbook income	**1 485 860**	**603 871**	**827 877**	**975 428**
	Salaries	1 064 557	765 987	792 048	836 751
	ICR	15 688	5 542	2 904	6 944
	Running costs	118 138	112 328	115 368	163 342
	Maintenance	589 302	469 496	-3 180	-1 034
	Travel Costs				
	Small equipment & KKW				
	Deferred Costs	150 000	165 000	61 800	61 800
	Total Expenses	**1 937 684**	**1 518 353**	**968 939**	**1 038 001**
SEM Unit From 2022 Microscopy Unit	Internal Invoicing	1 184 639	1 588 073	1 579 225	1 517 429
	External Invoicing	1 097 588	1 120 729	1 039 425	1 132 739
	Total logbook income	**2 282 227**	**2 708 802**	**2 618 650**	**2 650 168**
	Salaries	1 566 323	2 453 032	2 237 563	2 513 959
	ICR	219 451	224 146	207 885	226 548
	Running costs	112 013	275 843	179 803	340 570
	Maintenance	93 509	189 828	243 349	209 731
	Travel Costs		21 179		68 275
	Small equipment & KKW	75 347	24 058	32 841	119 934
	Deferred Costs	120 000	132 000	221 280	282 272
	Total Expenses	**2 186 643**	**3 320 086**	**3 122 722**	**3 577 025**

		2021	2022	2023	Projection 2024
ICP & XRF Unit	Internal Invoicing	881 442	1 258 680	1 120 588	1 261 565
	External Invoicing	3 470 563	3 733 736	3 828 503	4 263 446
	Total logbook income	**4 352 005**	**4 992 416**	**4 949 091**	**5 525 011**
	Salaries	2 191 359	2 273 082	2 386 284	2 453 785
	ICR	695 463	746 747	765 701	852 689
	Running costs	650 152	726 212	1 033 650	1 141 807
	Maintenance	343 292	825 264	64 551	48 460
	Travel Costs	60 768	52 933		38 482
	Small equipment & KKW	41 604	4 791	16 004	44 085
	Deferred Costs	399 997	439 992	600 000	600 000
	Total Expenses	**4 382 635**	**5 069 021**	**4 866 191**	**5 134 307**
DNA Unit	Internal Invoicing	4 199 985	3 525 681	4 068 018	3 580 153
	External Invoicing	5 499 622	6 885 051	9 136 958	9 658 051
	Total logbook income	**9 699 607**	**10 410 732**	**13 204 977**	**13 238 204**
	Salaries	4 169 205	3 485 899	3 647 163	3 725 263
	ICR	1 099 924	1 377 010	1 827 392	1 931 610
	Running costs	5 217 755	5 804 969	6 441 528	6 985 859
	Maintenance	131 906	66 303	76 885	51 257
	Travel Costs		962		
	Small equipment & KKW	52 995	298 123	-10 419	-431
	Deferred Costs	285 000	313 500	291 843	238 562
	Total Expenses	**10 956 786**	**11 346 767**	**12 274 392**	**12 880 053**
NMR Unit	Internal Invoicing	467 698	546 554	520 052	531 441
	External Invoicing	307 035	388 191	550 020	625 139
	Total logbook income	**774 734**	**934 745**	**1 070 072**	**1 156 581**
	Salaries	1 805 929	1 600 780	1 681 988	1 749 133
	ICR	61 407	77 638	110 004	125 028
	Running costs	465 393	598 477	314 545	424 712
	Maintenance	75 053	5 753	1 376	917
	Travel Costs				
	Small equipment & KKW				
	Deferred Costs				20 000
	Total Expenses	**2 407 782**	**2 282 648**	**2 107 914**	**2 275 027**

		2021	2022	2023	Projection 2024
CT Unit	Internal Invoicing	287 051	563 014	290 500	333 693
	External Invoicing	1 657 187	1 592 203	509 983	502 802
	Total logbook income	**1 944 237**	**2 155 216**	**800 483**	**836 495**
	Salaries	1 396 339	663 043	590 688	618 451
CT Scanner	ICR	263 351	319 254	101 997	100 560
	Running costs	149 628	176 635	190 583	381 819
	Maintenance	492 889	338 789	20 156	13 438
	Travel Costs				
	Small equipment & KKW	60 912			
	Deferred Costs	350 003	385 007	411 600	360 540
	Total Expenses	**2 713 122**	**1 882 728**	**1 315 024**	**1 456 300**
Neuromechanics Unit	Internal Invoicing	271 713	174 250	88 380	105 677
	External Invoicing	1 123 225	827 884	40 535	51 868
	Total logbook income	**1 394 938**	**1 002 134**	**128 915**	**157 545**
	Salaries	1 382 867	763 075	418 141	478 555
	ICR	224 645	165 577	8 107	10 374
	Running costs	49 810	156 445	80 462	59 584
	Maintenance	18 501	4 550		
	Travel Costs				
	Small equipment & KKW			20 550	13 700
	Deferred Costs	99 997	99 996	106 800	106 800
	Total Expenses	**1 775 819**	**1 189 643**	**634 059**	**628 736**
Vibration Spectroscopy Unit	Internal Invoicing	102 940	124 325	5 280	
	External Invoicing	4 416	18 897		
	Total logbook income	**107 356**	**143 222**	**5 280**	
	Salaries				
	ICR	883	3 779		
	Running costs	2 773	2 187	555	
	Maintenance				
	Travel Costs				
	Small equipment & KKW				
	Deferred Costs		109 992		
	Total Expenses	**3 656**	**115 959**	**555**	

		2021	2022	2023	Projection 2024
TOTAL UNITS' INCOME	Total Internal Income	10 402 199	10 088 184	9 967 659	9 871 700
	Total External Income	21 209 252	22 397 858	23 626 065	24 951 971
	Total Income: All Units	**31 611 451**	**32 486 042**	**33 593 723**	**34 823 671**
	Interest Received	849 006	1 386 828	2 116 938	2 627 704
	Funds Received VR(R)		1 000 000	1 000 000	1 000 000
	Salary Contribution VR(R)	4 346 081	5 213 114	5 092 607	5 419 922
	Infrastructure NII repayment				
	US Loan / ALT 2020 Funds: Detector CT				
	VAT refund on equipment			4 086 667	
	Faculty Contributions			3 000 000	
	NII LEVY	180 000	180 000		
	BIOGRIP LEVY	44 156	200 000	97 398	150 000
	VAT Refund on equipment	5 357 647	1 259 968	1 035 372	
TOTAL ADDITIONAL INCOME		**10 776 890**	**9 239 911**	**16 428 984**	**9 197 626**
TOTAL INCOME		**42 388 341**	**41 725 953**	**50 022 707**	**44 021 297**
Expenditure	Total Expenditure				
	Salaries: Admin	2 482 196	2 514 161	2 726 830	3 547 033
	Salaries: Units	18 098 282	16 553 643	16 512 470	16 973 434
	17% 20% ICRR (Indirect Cost Recovery)	4 199 126	4 461 946	4 724 068	4 989 631
	Running costs (sum of units)	7 849 376	8 986 726	9 112 625	10 732 389
	Maintenance (sum of units)	2 120 005	2 964 608	892 403	731 101
	Travel Costs (sum of units)	60 768	75 074	0	106 756
	Small equipment & KKW (sum of units)	302 273	418 992	91 356	244 641
	Deferred Costs	1 804 993	2 085 480	2 521 046	2 503 253
	CAF General Running Costs	411 876	506 170	638 805	487 597
	Students	201 596	34 543	80 016	0
	Interest	21 382			
	Travel Costs-Courier	69 688	112 637	78 678	86 933
	Development New Labs				
	Infrastructure	589 394	9 995		
	Equipment	17 135	27 111	11 395	51 911
	NMR Purchase	698 031	126 369		
	HPCL	1 000 000			
	Maintenance				

		2021	2022	2023	Projection 2024
	Equipment Repair: CT Scanner				
	Equipment Repair Fund	500 000	500 000	500 000	500 000
	CAF Vehicle Fund	45 000	45 000	45 000	45 000
	Equipment Replacement Fund	4 000 000	1 250 000	1 000 000	3 000 000
	Cyclotron Funds			6 700 000	
	MC ICP MS Funds			3 059 807	
	Total Normal Operational Costs	**44 471 122**	**40 672 455**	**48 694 499**	**43 999 679**
Surplus/ Shortfall	**Surplus/Shortfall per year**	**-2 082 781**	**1 053 498**	**1 328 209**	**21 618**
	Equipment Expenditure	**38 181619**		**19 654570**	
	NRF-NEP Total grants	7 120 740		10 000 000	
	ALT/US Funds	3 560 370		5 164 141	
	2020 ALT				
	Contributions: Faculty of Science			1 000 000	
	CAF Contribution	698 031		126 678	
	ALT FUNDS: NMR Purchase	12 402 478			
	Science Faculty: Contribution NMR	10 000 000			
	Strategic Funds: NMR	4 400 000			
	Insurance Claim			3 363 750	1 060 000
	Equipment Details	**38 181 619**		**19 654 570**	**1 060 000**
	Mass-Directed Auto Purification & QC system				
	Gemini 300FESEM with advanced system for automated 3D				
	Spectral Flow Cytometer	10 681 110			
	400MHZ AND 600MHZ NUCLEAR MAGNETIC RESONANCE	27 500 509			
	Cyclic IMS HDMS QT of Mass Spectrometer			19 654 570	
Funds		**12 456 829**	**22 874 130**	**25 553 691**	**27 092 686**
	Emergency Equipment Repair Fund	1 618 027	2 172 494	2 672 494	3 172 494
	Vehicle Replacement	302 546	360 092	405 092	450 092
	Reserve, Food Security Project	1 229 267	1 240 437	1 248 540	1 248 540

	2021	2022	2023	Projection 2024
Maintenance Fund Equipment: BD FACS Jazz sorter (2013)	1 394 496	1 463 516	1 512 840	1 512 840
Provision for Leave Payment	769 262	901 297	1 082 924	1 109 252
Equipment Replacement	4 000 000	5 250 000	3 250 000	3 250 000
LCMS Insurance		3 363 750		
Deferred Costs	3 143 230	5 122 543	6 681 802	8 649 468
Alt Funds 2022-2025 (CAF Running Costs)		3 000 000	2 000 000	1 000 000
Cyclotron Project 2023			6 700 000	6 700 000

CAF UNITS: Financially ring-fenced DSI funded research infrastructure platform nodes

		2020	2021	2022	2023	Projection 2024
NODE FOR INFECTION IMAGING (NII)						
	NODE Funding	3 742 420	3000 000			
	Bridging Funding					
	VAT Refund on Equipment			3 084 593	3 084 593	
	Interest Received	282 219	199 879	330 702	558 727	1 019 553
	Income	869 559	1 211 787	3 085 219	656 293	794 008
	Private Patients	939 909	4 112 235	6 454 310	9 505 372	12 171 058
TOTAL INCOME		**5 834 107**	**8 523 900**	**12 954 823**	**10 720 391**	**13 337 551**
	Salaries & Running costs					
	Building & Equipment	5 240 134	8 800 612	10 349 779	10 951 214	12 789 532
	Equipment Replacement Fund	3 122 671	366 473	50 635	36 900	55 169
TOTAL EXPENSES		**8 362 806**	**9 167 085**	**10 400 414**	**10 988 114**	**12 844 701**
YEAR END BALANCE		**6 300 684**	**5 657 499**	**8 211 908**	**7 944 185**	**8 437 035**
BIOGRIP NODE FOR SOIL AND WATER ANALYSIS						
	Internal	26 390	388 477	183 353	532 405	400 332
	External	819	239 745	477 219	859 002	1 374 116
TOTAL INCOME		**27 209**	**628 222**	**660 573**	**1 391 407**	**1 774 448**
	ICRR	164	47 949	95 444	171 800	274 823
	Running Costs	444 014	354 962	687 176	570 623	656 492
	Maintenance Costs	185 541	5 941	784 409	317 389	550 899
	Salaries	960 967	1 235 621	1 515 095	1 379 256	1 967 760
TOTAL EXPENSES		**1 590 686**	**1 644 473**	**3 082 124**	**2 439 069**	**3 449 974**

Notes: DSI financial year runs from 1 April – 31 March

Graphs Detailing Aspects of CAF Income During 2023

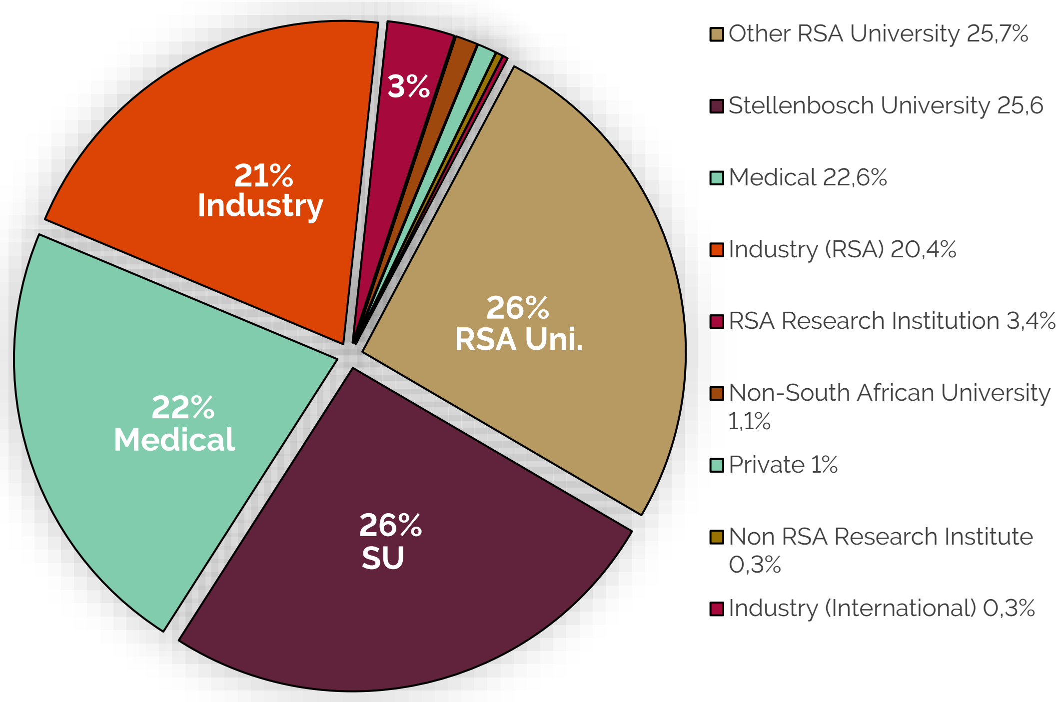


Figure 10: Percentage of income derived from the different categories of clients for 2023.

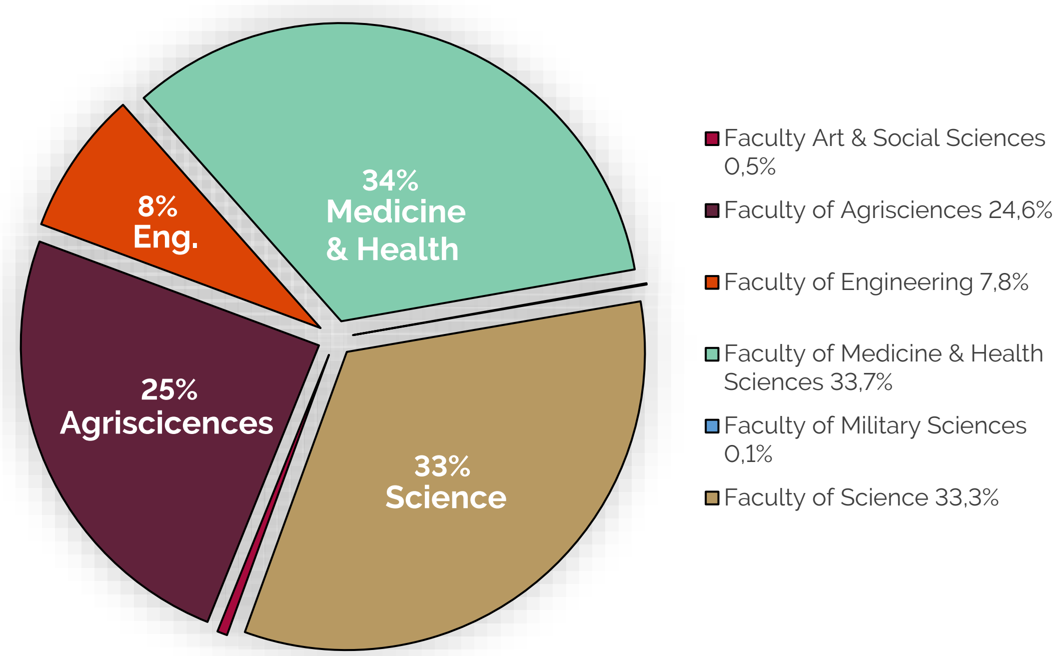


Figure 11: Analysis of the percentage of CAF income for 2023 from internal clients by faculty.

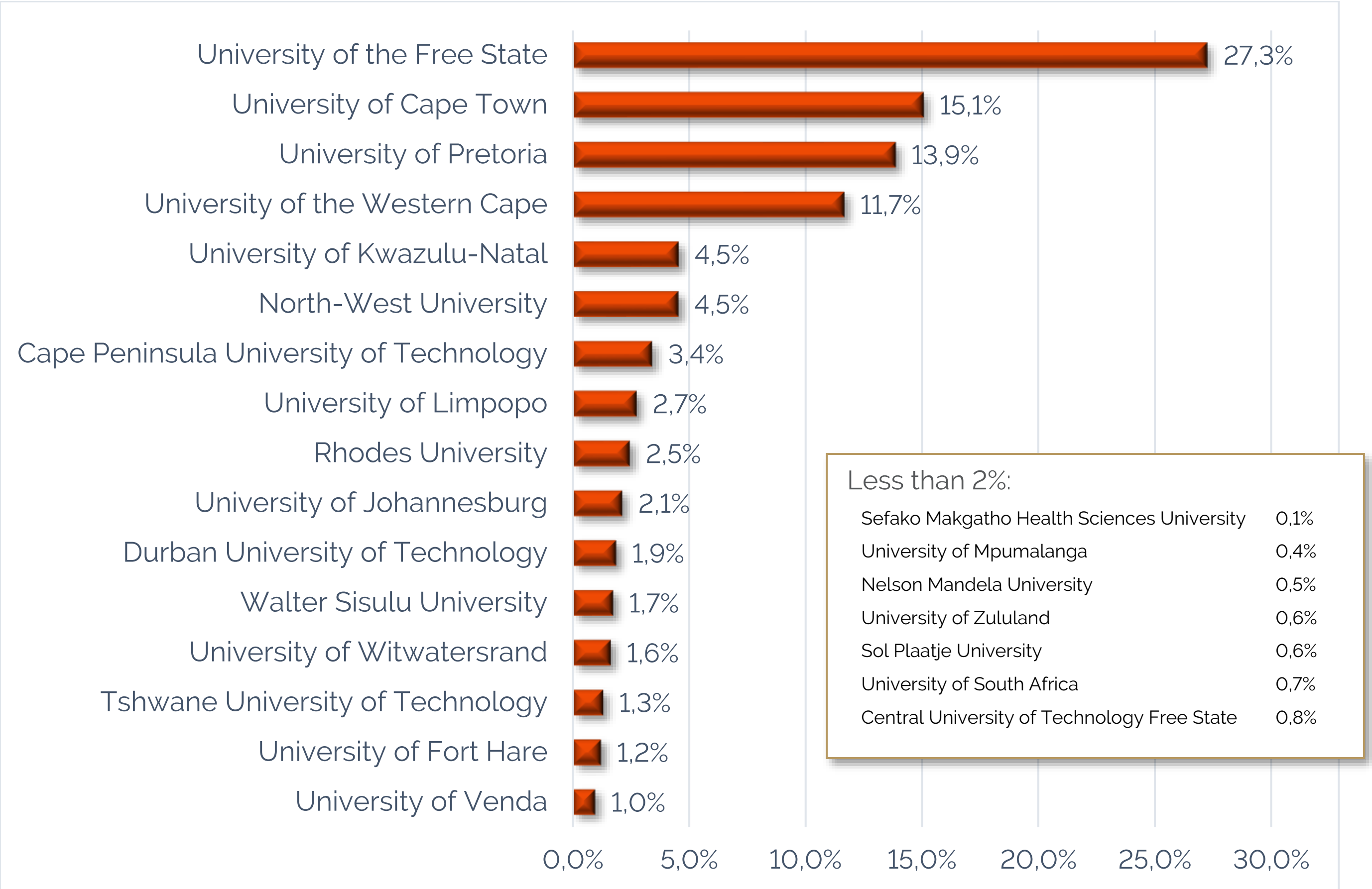


Figure 12: Analysis of the percentage of CAF income for 2023 from South African external academics by university.

CAF Structure 2024

MANAGEMENT

DIRECTOR: PROF GARY STEVENS

MANAGERS: MS SELINA BUDHRAM

MASS SPECTROMETRY UNIT DR MARIETJIE STANDER	**MICROSCOPY UNIT** MRS LIZE ENGELBRECHT
DNA SEQUENCING UNIT MR CARL VAN HEERDEN	**FLOW CYTOMETRY UNIT** DR DALENE DE SWARDT
CT SCANNER UNIT MS CARLYN WELLS	**NEUROMECHANICS UNIT** MR OLOFF BERGH
NUCLEAR MAGNETIC RESONANCE UNIT DR JACO BRAND	**ICP-MS & XRF UNIT** MRS RIANA ROSSOW
BIOGRIP NODE FOR SOIL & WATER ANALYSIS DR JANINE COLLING	**NUMERI NODE FOR INFECTION IMAGING (NII)** DR ALEX DORUYTER

Figure 13:: CAF structure for 2024 showing management units and nodes.

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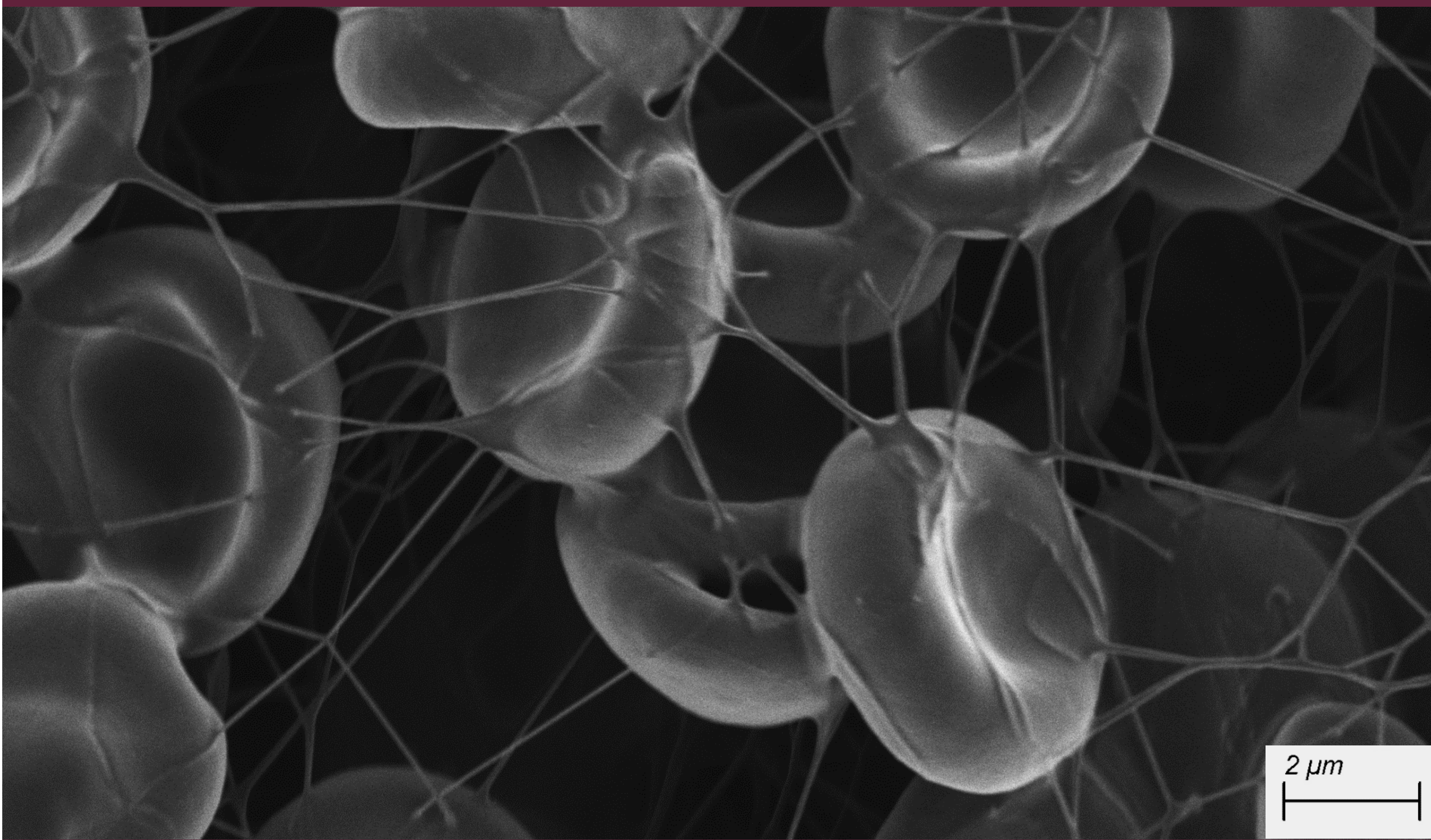

Above: A Secondary electron micrograph of a control whole blood sample, indicating the normal red blood cell shape and fibrin fibre interaction during clot formation. This is process is essential to monitor, as during the coagulation process any alteration can have downstream implications. The micrograph was captured on the Zeiss Merlin SEM housed within the CAF SEM Laboratory. The image was captured at 5.27K magnification. Credit: Dr Chantelle Venter, Physiology Department, Stellenbosch University.

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