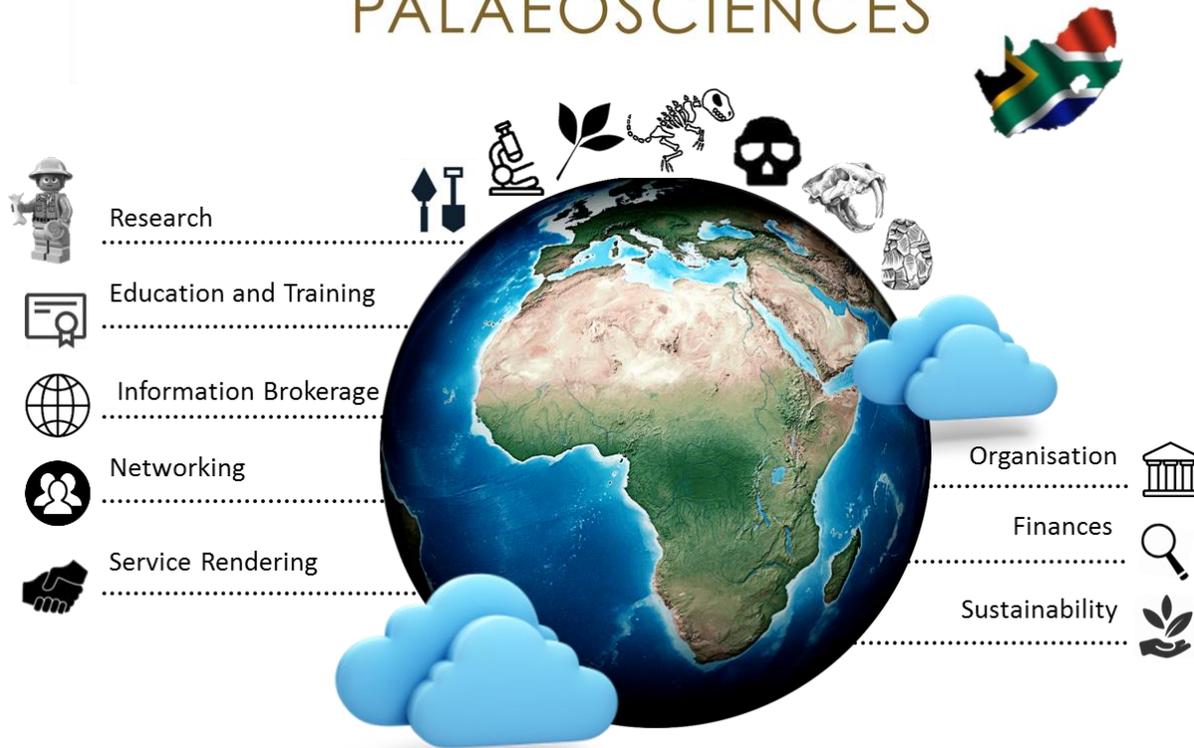


DST-NRF CENTRE OF  XCELLENCE IN
PALAEOSCIENCES



**Management Response to Mid-Term Evaluation Report
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Directors Summary

A panel of four Palaeoscientists conducted a three-day review of the DST-NRF Centre of Excellence in Palaeosciences (CoE-Palaeo/the Centre/CoE). The panel commented that they were impressed by the impact of the CoE-Palaeo, both regarding research output and in the creation of new opportunities for students, many of whom would have otherwise never pursued a career in the palaeosciences. Outreach efforts were also impressive, with the concepts of palaeoscience presented to a large audience of mostly school learners.

They reported that management of the CoE-Palaeo has been competent, with rapid response to queries and turn-around on proposals. They felt that fund administration needs to be more transparent with more overseas reviewers to avoid bias and conflict of interest, as well as providing feedback to applicants not funded.

Collaboration has been good overall but could be improved at some partner institutions. International collaboration could be used to leverage further funding support and exposure.

The greatest challenge going forward is to promote the establishment of permanent employment opportunities in the palaeosciences. A major concern is the diminishing of research and curatorial positions at partner museums. This needs to be tackled by the CoE-Palaeo in collaboration with the NRF and DST, and the public in general.

The review evaluation covered a five year period (2013-2017), and as the review took place only in July 2018, CoE-Palaeo management had pre-empted many of the findings of the review and had already implemented changes to various structures early in 2018.

The review panel addressed the following six evaluation questions (management responses are given in blue).

1. Did the CoE carry out the research proposed?

Panel Summary

The CoE-Palaeo is highly productive as reflected in the many publications and conference presentations which testify to the creation of new knowledge and techniques. Most researchers found that the awards granted were not always sufficient to cover operational costs, but that the funds received were essential to supplement their existing funded projects or to attract additional funding and that in most cases the research could be completed.

Research output at WITS and UCT was strong; output was relatively poor at the partner museums. Low publication rates from museums are also a consequence of under-funded curators not being able to attract students, while research goals do not motivate some curators. This has also been ascribed to the increasing burden of additional administration and

bureaucracy. Difficulties in accessing recent research materials are a disincentive as museums have cut back on subscriptions to academic journals. This also undermines the confidence of researchers.

The CoE has adopted as one of its key objectives recruiting the next generation of excellent researchers in palaeosciences through various mentorship programs and workshops on grant writing, research presentation, academic ethics, and Pan African Knowledge Exchange. It has succeeded in this regard even though South African black students still lack in the area of paleoanthropological research.

Review panel Recommendation and CoE-Palaeo Response

The CoE carried out the research proposed, but more effort is needed to convey the exciting results of the CoE. A special research symposium could be convened to showcase the key research of the CoE and to synthesise the science achieved to date with a special session on developing a research focus for the next 5-year period. The outcomes of the symposium could be conveyed via social media and the new CoE website to make the results and direction of the CoE available to the public.

[A research symposium is an idea that we have been deliberating on for a couple of years. Funding permitting, the CoE-Palaeo is keen to host a day research symposium that is open to the public and will generate media output. Right now our budget is fully committed for 2019.](#)

It is recommended that operational costs of research projects remain close to what they have been and that researchers be encouraged to use these funds as seed money to attract funding from other sources (NRF calls, such as AOP and PAST, but also international collaborative grants through the NSF in the USA or European Union). It was felt that more could be made of the unique South African record in attracting funds from overseas groups.

[This is an aspect which has been addressed in the past. The Centre does not have the necessary budget to fully fund the applications for funding it receives, and we make it clear to our grantees that they need to source additional funding from other sources including overseas funding bodies, which many have done. One of the most successful is from the Norwegian Research Council which supports the Later Stone Age Research of Prof Christopher Henshilwood. Funding raised in this manner does not come via the CoE but rather through our partner institutions where the researchers are employed \(i.e. Wits\). In this way, the CoE has been able to establish productive research programmes in strategic areas of the SA palaeoscience not traditionally funded in South Africa. For example, the CoE-Palaeo provided funding for productive research projects on the Origin of Life in the Precambrian fossil-bearing successions as well as the Ordovician–Devonian Cape Supergroup of South Africa. Sadly the outcome of the most recent African Origins Platform call of the NRF has curtailed the activities of many of these very productive world-class initiatives and researchers. The Centre also has long-standing relationships with several funding non-profit organisations such as the Millennium Trust and the Palaeontological Scientific Trust which already fund many of our initiatives.](#)

Considering the amount of funding WITS receives from the CoE it was felt that the university could make a more substantial contribution beyond the funding it already provides for ESI. Discretionary funds, support of advancing the qualifications of fossil preparators and technical field assistants, and a permanent position for the key technical position associated with the CT scanner are some examples of how WITS can further help to strengthen the CoE.

Wits does receive a large amount of funding from the CoE-Palaeo, but this is to support strategic initiatives of national importance and serving the national palaeoscience project such as the collections and the CT scanning facility. Wits also supports the largest palaeoscience research initiative in the country through the Evolutionary Studies Institute, and Schools of Geography, Archaeology and Environmental Studies (GAES), Anatomical Sciences, Animal Plant and Environmental Sciences (APES) and Geosciences. In addition from 2019, the University will also pay to the CoE-Palaeo, 10% of the annual CoE-Palaeo running budget obtained from the DST and NRF. This funding will be used for an Emerging Researcher Grant for black female researchers in the field of palaeontology and palaeo-anthropology. Wits already cover all the initiatives suggested by the panel, but the CoE-Palaeo Director will approach Wits to cover the salary for a technical position associated with the CT scanner as suggested.

Procedures surrounding the disbursement of CoE funds need to be made more transparent to the grant applicants. Perhaps successful awards could be announced on the website, and those that do not receive funding could be informed—at least briefly—as to why the application was not successful. It would also help unsuccessful applicants to be given access to the reviews anonymously so that they can improve their applications for resubmission. The reviewer pool is small and tends to overlap making for potential conflicts of interest among competing applicants, so it is recommended that more international reviewers are used (this is also a good way to advertise the CoE to a broader, international audience and may facilitate international collaboration).

Our funding guide clearly states the criteria under which the application is scored. All applications are reviewed at least twice and scored. Reviewers are selected from a number of researchers both locally and internationally. The scores go to the review panel that is made up of our Executive Committee, and on occasion, we bring in other researchers on the panel if required. In line with the panel suggestion we will in future:

- Provide reviews of unsuccessful applications so that applicants can improve their applications.
- We will post our postgraduate bursary grantees on the website on an annual basis.

Address the problem of museums being managed entirely by the Department of Arts and Culture. It is recommended that a transition strategy is embarked upon as a matter of urgency. One possibility is to reward researchers for publications, and another is to move Natural History Museums out of Arts and Culture into the domain of the Department of Science & Technology. Increase scientific and technical capacity at Natural History Museums and pay them a market

salary. Develop and implement a strategic plan for increasing the funding base for Natural History museums.

The problem of low research output from our museum partners has long been recognised and is a problem for the future of palaeoscience in the country. This is the result of a lack of vision and support of natural history research by museum managers employed by the Department of Arts and Culture (DAC). The CoE-Palaeo has requested intervention by DST and NRF for some time, but so far their efforts have not been successful. As the review panel stressed, this is now a matter of extreme urgency, CoE management agrees to tackle this problem head-on. However, as this requires high-level political intervention, it cannot be undertaken by the CoE alone without the dedicated participation and assistance of the DST and NRF. CoE management, in line with the review recommendation, recognises that natural history museums should move from DAC to DST.

As we have done in the past, we will continue to encourage museum researchers to become research associates of universities so that they can benefit from the publication subsidy scheme of the DOE to universities.

2. Did the CoE achieve its proposed education and training? Did it broaden and deepen the research community, particularly in terms of gender and racial diversity?

Panel Summary

The CoE invested around 40% of its budget in sponsorship of MSc and PhD bursaries, as well as post-doctoral positions. It also offered workshops on writing research proposals and research papers that were much appreciated by the students. CoE-PAL provided mentorship and to a number of students and showed a positive trend in increasing the number of South African black students in palaeosciences, especially females. The support of women students was generally very good and, although the number of black students supported increased over the 5-year period of the CoE, more effort is required to attract black South African students to the palaeosciences.

The review process for evaluating proposals was found it to be well considered and appropriate. The committee considered whether the number of participating institutions should be expanded and suggested that if expansion is to take place, this should be done strategically.

South African palaeontologists are recognized as leaders in Devonian, Permian-Triassic, and Triassic-Jurassic research. More time is needed to determine whether current students and postdocs will develop into next generation of SA scientists. Students interviewed were enthusiastic and keen on research careers in South Africa.

Review Panel Recommendation and CoE-Palaeo response

The CoE has several new initiatives in place to attract more black South African students, as they recognise that more needs to be done. However, the panel felt that more could be done and that the CoE needs to take on a more proactive role in attracting black students and supporting them to become among the new generation of palaeoscientists.

The CoE-Palaeo management is committed to being transformative in palaeosciences in South Africa and has worked hard on the process of corrective action. The CoE has been operational for only five years, and over the years we have increasingly supported more students from designated groups such that about two-thirds of the bursaries currently awarded are to people from designated groups. This is a big achievement considering that there were very few people from previously disadvantaged groups involved with palaeosciences at the time of inception of the CoE. In addition, the CoE runs the most active and productive palaeoscience outreach initiative in the country, targeting schools of previously disadvantaged communities to expose learners to the palaeosciences. This scheme physically reaches more than 400 000 learners annually. The CoE also financially supports the visionary PalaeoAccelerator Programme of our grantee, Prof Jonah Choiniere, which identifies high performing undergraduate black females in their 2nd year of university study. The students join a supplementary academic programme for six hours per week for 14 weeks, where they learn transferable skills such as GIS data collection and analysis, palaeosciences legislation, three-dimensional data collection and analysis (e.g., CT-scanning), and palaeontological fieldwork methods. The CoE hopes to inspire other universities and museums to develop more programmes of this nature and will strive to continue to expand its footprint by attracting more black South African students.

In addition, The CoE Education Officer provides courses to tourism guides on South African's fossil heritage and facilitates guide accreditation through recognised service providers.

The CoE executive committee needs to be transformed. There are palaeoscientists of colour (Prof A Chinsamy-Turan and Dr D Stynder both at UCT, for example) and there are palaeoscientists that have a strong track record of producing strong black graduates that could be approached to serve (Prof R Ackermann, to give just one example, I am sure there are others familiar to the executive committee members). The CoE does intend to make several replacements, but these were not felt to be sufficient nor necessarily geared to address the needs of transformation. They could appoint a special member on the executive whose sole focus is to promote and encourage transformation in the palaeosciences, a field which has historically struggled to achieve racial diversity.

The issue of transformation of the Executive Committee has long been recognised, and as of February 2018, the composition of the Executive Board (with the exception of the Director) is all female. Selection of Board Members (as per our founding documentation) is not based on Partner representation but the Research Themes outlined in our annual business plan. The female researchers currently on the Executive are leaders in their respective fields and have a vibrant research programme that has attracted an increasing number of young black females into palaeoscience research. Dr Mirriam Tawane (Curator at the Ditsong Museum) is an emerging

researcher who is a member of our Executive Committee is focused on promoting and encouraging transformation in palaeosciences. Since the beginning of 2018, Professor Chinsamy-Turan and Dr Deano Stynder (both UCT faculty) have been members of our Research Advisory Committee.

CoE-PAL needs to be cognisant that not all potential mentors really understand the culture and background of South African black students. It should make sure that mentors are ready and willing to go the extra mile to encourage, direct, and make South African black students successful in their career.

The Centre along with its Partners and Collaborators has long recognised this problem and for several years has run a successful mentoring programme to assist South African black students to become successful in their careers. The CoE-Palaeo organises Mentorship to Publication Writing Workshops for postgraduate students, postdoctoral fellows, and emerging researchers to enhance their writing skills and getting their research into publication.

CoE-Palaeo should give the transformation process more serious consideration particularly in getting black South African students trained in palaeoanthropology. It is ironic that a country with enormous paleoanthropological potential, an area of national pride, does not have many black South African researchers in palaeoanthropology.

The CoE-Palaeo management is cognisant of this problem and has worked hard to address it through many different initiatives, including targeted outreach programmes. Our efforts are reaping rewards and we are increasingly getting more black students to study palaeosciences. We do however need to point out that in the past five years there have been four black woman PhD palaeoanthropology graduates produced in South Africa, three from Wits and one from UCT, and there is a current upward trend of black female postgraduate students in palaeosciences. A major facilitator of this increase in the past has been the availability of dedicated palaeoscience bursaries via the African Origins Programme. Sadly the recent outcome of the NRF African Origins programme has not funded the researchers at Universities who have the most potential to gather students from previously disadvantaged backgrounds. It is essential that the CoE-Palaeo and African Origins Platform work synergistically to make available NRF bursary funding reach as many people (from designated groups) as possible.

The CoE clearly places merit ahead of transformation in the funding of grant and bursary proposals, which is fine, but in that case, they need to step up to the challenge of ensuring that black students are mentored and encouraged to pursue graduate studies and to submit well written and fundable proposals. Some researchers are doing this already; the accelerator programme of Dr J Choiniere is a good example, but a lot more needs to be done by other researchers to ensure transformation occurs.

As pointed out above, this process is well underway with numerous initiatives begun by our Centre. The CoE-Palaeo and the Palaeontological Scientific Trust have developed a postdoctoral Masters bursary for black female students. The value of this bursary is double that of the standard

bursary. The criteria to be award this bursary is that the applicant must receive at least a 70% and have a supervisor that has a history of excellent supervision.

The anxiety felt by students including post-docs about their funding in subsequent years could be alleviated by giving feedback to them after they have submitted their progress reports. Update bursary and postdoc proposals and annual reports to better assure continued funding for high-performing students. To decrease the perception of ESI bias, encourage applications for postdocs from a wider range of CoE partner organizations going forward.

The CoE-Palaeo management recognises the anxiety caused to students and postdocs by not knowing whether funding will be renewed. Accordingly, since 2018, we have implemented a renewal form for Masters & Doctoral Bursaries and Postdoctoral Fellowships which also requires a letter from their supervisor or host stating progress. This is sent for review, and if progress is satisfactory, funding is renewed for a further year, and students are notified early in December. Applications for postdoctoral fellowships have always been encouraged by all our partner institutions, but it is up to them to make an application.

3. Does the CoE make its results and databases available? (Information brokerage)

Panel Summary

Published papers in research journals are the main mechanism for making the results of the CoE available. The revamped website and social media links convey findings to the world at large. Results are also regularly presented at international and national meetings.

Fossil holdings of museums affiliated with the CoE (i.e., ESI, Iziko South African Museum, National Museum, Ditsong Museum) generally have well developed electronic databases, and in terms of data accessibility, museums in South Africa are comparable to those in the United States and Europe. Within each museum, certain collections have received less effort towards cataloguing and digitization (e.g., non-hominids from the Cradle of Humankind) and these will require special attention moving forward. CoE funding would be appropriate for such projects.

Panel Recommendation and CoE-Palaeo Response

More effort needs to be placed in making the exciting results of the CoE available to the general public. The creation of a Scientific Communications Officer is a major step in the right direction, and this will hopefully lead to more content on the website and social media outlets. The group at WITS has a close link to the Media Department, but not clear that other partner institutions have this facility or make use of it.

The CoE in Palaeosciences is the most successful CoE as regarding public outreach and goes to great lengths to make the exciting research results of the Centre available to the general public. This is done through our extensive outreach programme and also through the efforts of the scientific communications officer who has set up excellent processes to reach a wider audience.

The CoE has close collaboration with the Wits media office which is very supportive in highlighting discoveries of all our not only Wits but also those of our Partner Institutions. All grantees are encouraged to contact us, so we can give guidelines on how to develop a media release, assist when needed and provide media contacts. We are linked to SAASTA, NRF, and DST. Through the communications team, the CoE has had two discoveries that have been listed as top ten discoveries for 2018. A more extensive campaign will require much greater financial support and can be done provided that more funding is forthcoming from, for example, NRF agencies such as SAASTA. Up till now we have not been successful in rising funding from SAASTA despite numerous attempts.

Excellent progress has been made on outreach to the general public, which fosters an appreciation for shared South African heritage. In future, consider the outreach officer (Ms Tommy) developing The Brain Scoop -type videos highlighting different researchers and students.

As pointed out above, the CoE strongly supports its very active outreach programme. If we have additional resources available we will consider developing The Brain Scoop-type videos highlighting different researchers and students as suggested.

4. Does the CoE facilitate national and international collaboration and networking?

Panel Summary

The CoE provides a network and sense of cohesion and identity among palaeoscientists in South Africa. In some cases, the networking among partners was far better than within institutions, particularly at UCT, where few of the CoE supported researchers appear to collaborate with one another. The CoE is active in networking and collaboration with other African countries, particularly in East Africa.

There is widespread dissatisfaction with SAHRA: permit requests take a long time to process, routine requests lack timely response, and the underlying legislation hinders research. In general, SAHRA staff members did not acknowledge these deficiencies.

Panel Recommendation and CoE-Palaeo Response

A greater effort needs to be made to increase collaboration within the partner institutions, and it would be advantageous to increase collaboration with international partners, particularly to leverage more funding. Europe and North America both have large programmes in palaeosciences, and these could be tapped more by the CoE to attract researchers to South Africa's unique and important fossil localities.

The CoE-Palaeo management does not agree with the findings of the review panel as members of the CoE are extremely active in national and international research collaboration, and there is a great deal of national inter- and intra-institutional collaboration which is well documented. UCT

is one exception where there is less intra-institutional collaboration. The current high degree of collaboration is strongly encouraged by the CoE, but we are also aware that too much intra- and inter-institutional collaboration amongst South African researchers could lead to “dwarfing” of research ideas and ideals in our country. For the moment CoE management is proud of the very wide web of international researchers involved in our programmes. As explained in section one above, international collaboration already leads to the enhancement of research budgets available for South African palaeoscience research, but we will strive to improve this situation.

The bulk of the funding goes to WITS, which is not surprising given the size of its palaeoscience community, but more effort could be made to reach out to other universities in South Africa that have fledgeling programmes, such as what they are initiating with the recently established Sol Plaatjie University in Kimberley.

Because it has the largest palaeoscience programme in the country, Wits submits the greatest number of funding applications. As pointed out later in the report of the review panel, the CoE needs to be circumspect in taking on more partners as this will “dilute” funding available to current partners. CoE management, as emphasised in our five-year review documentation, are looking to bringing on additional strategic partners if they have particular strengths which they can bring to the CoE. We are currently in discussion with Sol Plaatjie University and the University of Johannesburg.

CoE-PAL appears to have different levels of communication, or lack thereof, with its partners, especially the museums. It should consider having members in its executive committee and steering committee from all of its partners. There is a need to enhance communications within the UCT palaeosciences group. Some UCT researchers felt poorly informed about CoE strategic directions and planning. There is only one UCT person (Prof. Judith Sealy) on the executive and steering committees, which is not enough.

Different levels of communication with our partner institutions are useful feedback from the review panel. CoE management strives to keep open lines of communication with all partners and makes a point of visiting each of the partner institutions at the beginning of the year to have open discussions on how to improve what the CoE offers. We also call all the members of the UCT palaeosciences group to a meeting at a single venue at UCT to discuss issues, but many of the UCT collaborators do not attend. At least three UCT staff serve on the Executive and Scientific Advisory Committees of the CoE, and all our other partner institutions are represented on the various CoE Committees.

There is widespread dissatisfaction with SAHRA. Lobby SAHRA to update policies regarding museum research permits, developing MOUs that shift day-to-day burden to relevant museum professionals.

Inappropriate heritage legislation for palaeontology (based on archaeological principles) is the main reason why the palaeontology community has a problem with SAHRA. The Palaeontological Society of Southern Africa had tried to address this problem with SAHRA for two decades, even

before the legislation was promulgated but SAHRA has been intransigent to the recommendations and needs of the palaeontologists. The CoE-Palaeo director has taken a lead on engaging with SAHRA on these issues for the past 20 years and continues to lobby. The biggest problem is that SAHRA does not accept that there is a problem as stated by the review panel.

5. Does the CoE provide service rendering to the public and government?

Panel Summary

The CoE is a source of new and exciting findings about South Africa's deep past which impact everyone in terms of understanding their origins, both in the context of the deeper tree of life and the more immediate origin of our species. The CoE has funded a number of outreach programmes and these have been very successful in reaching mostly school learners, with upwards of 400,000 learners a year. The website and social media and news outlets are the other way in which the CoE provides a service to the public, by informing them of the latest scientific findings and what these mean in terms of our understanding of our origins.

Panel Recommendation and CoE-Palaeo Response

Annual reports need to be posted on the website. The outreach efforts have been very successful in terms of exposing the general public to the concepts and findings within the palaeosciences. What is less clear and difficult to measure, is the impact of this exposure. Has it enlightened people to their origins and enriched their lives? Does it create anxiety around their religious beliefs? Does it attract more learners to the palaeosciences? The revamped website can be used to monitor the feedback from the community that has access to the internet and to this end Google and other search engine analytics can be useful in determining what approaches and web pages are most successful in reaching their targets.

Since February 2018 all the CoE Annual reports have been available on the website. We are aware that the CoE outreach efforts have been very successful regarding exposure, but what is important is the impact of this exposure. For this reason, the CoE, through its outreach officer, has undertaken several different studies of palaeotourism projects and its school outreach programmes to determine the impact of its outreach programmes. Additionally, two higher degree education students are undertaking research to determine how the effectiveness of the curriculum-based outreach programme of the CoE.

Museums are well placed to conduct outreach and public programmes relating to the palaeosciences. These activities are aimed largely at school learners, and it is important that such activities are kept in balance with research programmes. Some 'star' researchers have been able to attract good media attention, but these are rare instances.

Museums should be well-placed to conduct outreach and public programmes relating to palaeosciences. The CoE outreach officer has gone to great length to hold workshops for museum education departments, but despite these, the outreach programmes of the education

departments of our museum partners have not been very effective. The greatest success has been through individual palaeontologists at the Albany, Iziko, National and Ditsong museums who have now taken to running their programmes independent of the education departments of their museums.

Museum curation and collections management: Curate uncatalogued fossil collections and begin process of digitizing non-databased fossil collections. Transition legacy databases to SPECIFY, in collaboration with national museum collections initiative, and make collections data available online.

We concur with the review panel on issues of curation and collections management and their great importance. Collections databases need to be transitioned to SPECIFY. This is an expensive exercise and is currently being led and financed by the national museum collections initiative of SANBI. The CoE is very aware of this process and is fully supportive of the national museum collections initiative.

6. Is the CoE well managed in terms of leadership, staffing, transformation and plans for the future?

Panel Summary

The CoE is well managed, and participants were highly impressed with the personal attention they received and the speed at which funding decisions were made and funds made available. The online application is straightforward, and although the amount of paperwork required for applications is cumbersome, it is manageable. Some researchers were concerned about the review of proposals by such a small research community and would have preferred more outside consultation of proposal reviews. Others wanted more transparency and requested feedback on why some proposals were not funded.

The CoE has made specific efforts to sustain and support research personnel at the national museums. There are many concerns about museums: a major concern is that current museum directors have little understanding of research and of the scientific disciplines they manage. A knock-on consequence is the appointment of inappropriate museum boards, with no scientific background. Inappropriate appointments are being made to key research posts and some appointees lack the requisite qualifications to pursue research.

An ever-increasing burden of additional bureaucracy imposed on researchers impedes their capacity to deliver research outputs. Cost cutting within museums has resulted in formerly well-established research libraries terminating important journal subscriptions, placing an additional financial burden on researchers trying to access research materials.

Museum researchers are struggling to spend grant moneys as museums now have a procurement problem that has been created by the new museum boards. Unbending rules of "Supply Chain

Management” are hampering spending and grants are not being spent because of rigorous bureaucracy.

It is clear from conversations and interviews with researchers, post docs and post graduate students working in the palaeosciences, that there is a deep underlying concern that, although top quality graduates are undoubtedly being trained in the field, there are no real job prospects. Over the past 25 years there has been a marked attrition rate in posts being made available in museums.

Panel Recommendation and CoE-Palaeo Response

While management of the distribution of funds is well done, it was felt that more could be done in terms of leadership and a vision of the way forward for palaeosciences in South Africa. This could be achieved by a more clearly stated or visible vision statement for the CoE and a concrete plan to deal with the future of the palaeosciences.

This is useful feedback from the panel. We accept that our vision needs to be updated and better communicated to our members so that we all strive toward the same goals. In 2019 researchers of CoE-Palaeo community will hold a think-tank about the next ten years of Palaeosciences in South Africa; this exercise has already been undertaken with the students in 2018. The CoE vision and mission statement is:

Vision: to be a unique African Centre of Excellence for the comprehensive study of the evolution of life and humans on Earth from its Origins to the Middle Stone Age.

Mission: The CoE will provide infrastructure, resources and collegial ambience to which world-class researchers from all disciplines are attracted and in which intellectual excellence will be stimulated and flourish.

Key areas of concern are transformation (already discussed) and the lack of permanent positions in the field. Why train all of these students if there are few prospects of long-term employment for them in the palaeosciences? This problem goes beyond the CoE, but the CoE has made a big difference for some museums and can continue to help the museums re-establish their research personnel. However, the CoE doesn't have enough funding to turn about the rapid and worrisome decline in the museums and its leadership needs to advocate to government for more support and specifically the creation of museum research positions.

These issues have all been dealt with at various stage of this report. Transformation is being addressed on an ongoing basis; the problem of declining research in museums is bigger than the CoE and needs to be addressed by the government at a high level through the DST and DAC. The CoE Director will set the process in motion, as in the past, but now the situation is dire and SA could lose its competitive edge in palaeoscience research at the very institutions which are charged with the duty of preserving and curating the palaeoscience heritage of the country. The decline in research positions at museums with non-competitive remuneration levels for scientists

needs to be addressed as this is leading to the lack of employment possibilities for the high-level graduates produced through the efforts of the CoE.

The CoE, in collaboration with DST and NRF, should attempt to bolster the capacities of partner museums and other higher education institutions, by either supporting museums to open new positions or encouraging universities and colleges to open programs in palaeosciences including palaeo-tourism. Such programs could absorb a number of newly minted MScs and PhDs as lecturers and researchers.

As stated above this problem is bigger than the CoE can resolve, but the CoE will set the process in motion to encourage DAC and DST to address the lack of palaeoscience research capacity at South Africa's natural history museums.

There is a clear need to develop a long-term sustainable strategy for palaeosciences in order to move towards a National Institute of Palaeosciences. One possibility is to explore development of CONICET or CNRS-model national institute, with palaeoscientists hired by government but housed at relevant institutions, particularly museums.

This is a most important suggestion of the review panel and needs to be addressed with urgency. The review process has pointed out that the CoE is very active in all areas of its mission which are research, training, outreach, palaeotourism development and heritage preservation and has suggested that the activities of the CoE be funded by the DST and NRF for a second term. Now the CoE, in collaboration with the DST and NRF, needs to develop the move towards a National Institute which will be initiated in 2019.

Panel Conclusion

In its first 5 years, the CoE-PAL has had a big, positive impact on the palaeosciences in South Africa. The programmes at WITS and UCT, already strong, have been made stronger and although difficult to quantify the impacts because of the lag time involved with publications, promotions, rating of researchers and graduating of students, it would appear that all of these aspects have improved markedly with the additional funding made possible by the CoE. The panel in its deliberations heard many positive outcomes and opportunities that simply would not have been possible without the CoE-PAL. It is, therefore, the recommendation of the panel that the CoE-PAL continues in its second 5-year term. The panel has made a number of recommendations based on the feedback it received from the various stakeholders in CoE-PAL on ways to enhance and improve the outcomes for the second term and, in particular, for setting the stage for a viable and productive palaeoscience community going forward beyond the CoE-PAL.

First and foremost, CoE-PAL needs to proactively address the needs of transformation within the palaeosciences. Progress has been made in the first 5-year term, but more needs to be done to ensure a greater representation of black South Africans in the palaeosciences, particularly in palaeoanthropology. The administration of the CoE-PAL has been well done, but needs greater transparency to how funds are allocated and why some proposals are not funded. Collaboration

among South Africans is generally good, but lacking at some institutions and international collaboration could be heightened, particularly in using CoE seed funding and South Africa's unique fossil record to leverage funds from wealthier overseas nations. Outreach has been excellent and should continue, but more emphasis needs to be placed on ensuring that outreach is effective. The new website and social media outreach efforts hold much promise in achieving these goals, as the science that is being done by the CoE-PAL is exciting and the public has a right and a need to understand these new results.

Finally, one of the biggest issues concerns the future of palaeoscience in South Africa, namely the availability of career positions. The South African palaeoscience community has always tended to be small, but highly productive. Recent trends, most evident at the national museums of a dwindling research effort, compounded by administrative hassles, do not bode well for palaeoscience in the country. The CoE-PAL along with the NRF and DST must work toward reversing this downward spiral, and this is perhaps the greatest challenge facing the CoE-PAL, but one that must be tackled head-on to ensure the future of the palaeosciences in South Africa.

Conclusion by CoE-Palaeo Management

The Review has highlighted the following four long-term issues which must be addressed by CoE-Palaeo management :

1. Establishment of a National Institute. The review has demonstrated that the Centre has excelled in all its KPAs and that the geographic advantage offered by the extensive palaeoscience record of South Africa and the world-class research it generates is worthy of the establishment of a world-class National Institute for Palaeosciences. This must be vigorously pursued.
2. Address the issue of poor palaeontological research productivity by natural history museums. These institutions curate the palaeoscience collections of the country and are required to undertake research on them. Natural History Museums fall under DAC who do not understand the requirements of natural history research resulting in a perilous drop in palaeoscience research and technical positions. The review recommends an urgent transition strategy. One possibility is to reward researchers for publications, and another is to move Natural History Museums out of Arts and Culture into the domain of the Department of Science & Technology. This needs to be tackled by the CoE in collaboration with the NRF and DST.
3. Proactively address the needs of transformation within the palaeosciences. Progress has been made in the first 5-year term, but more needs to be done to ensure greater representation of black South Africans in the palaeosciences. Various measures are in place, and these will be enhanced and speeded up in 2019.
4. Seek ways to increase employment possibilities for palaeoscientists in South Africa. Top quality PhD graduates are being produced who are seeking employment in the country.

Possibilities exist at academic institutions such as universities, museums and the Council for Geoscience, but entrepreneurial possibilities such as palaeotourism, heritage impact assessments etc. must also be explored.