



**NATIONAL RESEARCH FOUNDATION (NRF)
EVALUATION OF THE CENTRE OF EXCELLENCE FOR
MATHEMATICAL AND STATISTICAL SCIENCES (MaSS)
(for the period 1 April 2014 to 31 December 2017)**

**18th to 20th September 2018
University of the Witwatersrand (West campus)**

Name	Institution
Evaluation panel members	
Prof. Maxim Finkelstein	University of the Free State, South Africa.
Prof. Michael Shatalov	Tshwane University of Technology, South Africa
Prof. Mariano Torrasi	University of Catania, Italy.
Prof. Mahouton N Hounkonnou	University of Abomey-Calavi, Benin Republic.

Abbreviations and Acronyms

APR	Annual Progress Report
DST	Department of Science and Technology
CoE	Centre of Excellence
CoE-MaSS	Centre of Excellence in Mathematical and Statistical Sciences
ED	Executive Director
KPAs	Key Performance Areas
KPI	Key Performance Indicator
MaSS	Mathematical and Statistical Sciences
NSI	National System of Innovation
NRF	National Research Foundation
RCCE	Research Chairs and Centres of Excellence
RE	Reviews and Evaluations
SER	Self-Evaluation Report
ToR	Terms of Reference
SU	Stellenbosch University
TUT	Tshwane University of Technology
UCT	University of Cape Town
UJ	University of Johannesburg
UKZN	University of KwaZulu Natal
UP	University of Pretoria
Wits	University of the Witwatersrand, Johannesburg

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Executive Summary

In 2008, the Department of Science and Technology and the National Research Foundation (DST-NRF) Review of the Mathematical Sciences Research in the South African Higher Education Institutions International Review Panel Report recommended that there was a dire need for the strengthening of the Mathematical Sciences in South Africa. Following this recommendation, the DST-NRF Centre of Excellence in Mathematical and Statistical Sciences (CoE-MaSS) was established on the 1st of April 2014 in order to integrate areas of research initiatives in the Mathematical and Statistical Sciences (MaSS).

The CoE-MaSS is a part of a national system of CoEs in various disciplines. Its goals and objectives are aligned with the general Programme Framework document issued in 2004 by the Department of Science and Technology and the National Research Foundation. The CoEMaSS is the group of numerous Node Institutions (at present - sixteen) comprising the vast research network that is believed to grow further in the future. CoEs are a mechanism for the DST, through the NRF, to fund research and postgraduate education in pre-specified MaSS research fields in South Africa.

In accordance with the ToR, the purpose of this evaluation is to assess the performance of the CoE-MaSS in order to provide the NRF and DST with information on progress in the period of 2014-2017 and up to the date of the evaluation. This was performed with respect to the following key performance areas: research/knowledge production, education and training, information brokerage, networking and service rendering.

We concur that the initial proposals for the establishment of the CoE-MaSS have been implemented to a reasonable, satisfactory extent, as there are many objective hurdles in running such a big project. We feel that the main and the most important success of the Centre is in developing the strong research environment and culture to uphold its objectives. Furthermore, a large number of bursaries were given to postgraduate students that resulted in substantial achievements in education and training. The Centre had sponsored numerous conferences, workshops and other events that contributed greatly in dissemination of mathematical research, education of upcoming researchers and networking. On the other hand, the performance of the Centre can be, obviously, improved taking into account the detailed recommendations of this evaluation report. For instance, the student composition needs to be improved and more South African citizens need to be put through. More Historically Disadvantaged South African (SA) Universities should be involved in activities of the CoE-MaSS. Travel grants for postgraduate students and postdocs should be also implemented.

Our *main recommendations* to the DST-NRF are:

We strongly believe that for the benefit of SA mathematical sciences, the Centre should be funded, at least, for the next 5-10 years with a possibility (as suggested in the self-evaluation report) to become a National Centre of Mathematical Sciences. The latter will, obviously, depend on availability of a funding instrument to support such a global national initiative.

For the next funding cycle, we would also recommend and appreciate the increase in funding from the DST-NRF. We understand current monetary constraints. However, recently, due to phasing out of incentive funding for rated researches, the considerable funds were set free and

promised by NRF to be used by other instruments. It will be most advantageous to the CoEMaSS if a portion of these funds is used for the increase in its funding.

Background to the evaluation

In 2008, the DST-NRF Review of the Mathematical Sciences Research in the South African Higher Education Institutions International Review Panel Report recommended that there was a dire need for the strengthening of the Mathematical Sciences in South Africa. This report highlighted a series of recommendations, including the need for an intensive focus on (i) capacity development, (ii) interconnectivity, (iii) strengthening foundations, (iv) building a stronger image of Mathematical Sciences, and (v) further developing Statistics as a discipline in crisis. A major concern raised by the review was the academic isolation of researchers and postgraduate students. The Panel Report argued that the institution-focused approach to undertaking research in the Mathematical Sciences needed to be transformed into a national and even international approach.

The DST-NRF Panel Report also indicated that the field of Statistics was in crisis with blockages to research and human capacity development having led to the field being in danger of disappearing completely due to a lack of academic capacity, especially the future PhD supervision capacity in the field.

The recommendation from the 2008 DST-NRF Review was that a National Centre of Mathematical Sciences be formed to serve all South African Institutions. This, in fact, implied a very substantial funding, which was not available in the country. Therefore, as the first step in the highlighted direction, a smaller version of the proposed entity with national and international reach, the DST-NRF Centre of Excellence in Mathematical and Statistical Sciences (CoE-MaSS) with the first cycle period from April 2014 to March 2019, was established.

The CoE-MaSS is a part of a national system of CoEs in various disciplines. Its goals and objectives are aligned with the general Programme Framework document issued in 2004 by the Department of Science and Technology and the National Research Foundation. In accordance with this document, there are five *key performance areas* of CoEs:

- Research/knowledge production;
- Education and training;
- Information brokerage;
- Networking; and
- Service rendering.

Furthermore, the objectives of CoEs are to:

- Exploit the competitive advantage vested in outstanding researchers;
- Reward, retain, sustain and improve scientific excellence within the CoE;
- Integrate smaller and related research initiatives into one programme within the niche area of the CoE;
- Achieve economies of scale through the optimization of resources and effort by sharing personnel, equipment, data and ideas;

- Provide secure and stable funds for research and knowledge dissemination within the CoE network;
- Support planned, strategic, long-term research;
- Develop human capacity;
- Contribute to the transformation of individual niche knowledge enterprise;
- Expand the national research base;
- Contribute to the transformation of the NSI.

The evaluation process regarding these general objectives and key performance areas are presented in more detail in the following section.

Evaluation questions that were addressed

In accordance with the Terms of Reference (ToR), the purpose of this evaluation is to assess the performance of the CoE-MaSS in order to provide the NRF and DST with information on progress in the period of 2014-2017 and up to the date of the evaluation. As stipulated in the ToR, this is done:

- In terms of its alignment with the CoE Model;
- In delivering on the objectives and key performance areas of the CoE Model;
- In terms of impact in South Africa and the NSI;
- To establish whether the research strategy and research priorities of the CoE are aligned with relevant government strategies and initiatives as expressed by policy documents in the focus area of the CoE.
- To make recommendations to enhance the CoE's performance; and
- To ensure sustainability, alignment of priority and relevance in its mandate as a CoE within its niche areas of specialisation.

The following *evaluation dimensions* were addressed:

- Implementation and management of the CoE to date;
- Provision of administrative and other logistical support for the CoE's operations;
- Extent to which the proposal for the establishment of the CoE has been implemented to date;
- Future and sustainability plans of the CoE;
- Overall performance of the CoE in terms of its mandate clustered around the Key Performance Areas (KPA's).

These KPAs are:

- **Research:** that should be focused on the creation and development of new knowledge and/or technology to the internationally competitive level.
- **Education and training:** human resource development, which is a marker for this KPA should be done through masters and doctoral programmes, post-doctoral support, joint ventures in students and young professionals training, etc. Particular attention should be paid to racial and gender disparities.

- **Information brokerage:** aimed to provide access to a highly developed pool of knowledge, maintaining databases, promoting knowledge sharing and knowledge transfer, etc.
- **Networking:** through networking, the CoE-MaSS is expected to actively collaborate with reputable individuals, groups and institutions nationally and internationally.
- **Service rendering:** the CoE-MaSS is to provide information, analysis, policy, and other services, including informed and reliable advice to government, business, industry and civil society.
- **Management of the CoE:** should be assessed in terms of leadership, staffing, transformation, location of the CoE, funding/financials and future plans (change).

The sources for evaluation are: the Self-evaluation report, the interviews and discussions with various stakeholders, examination of facilities and venues of the Centre, ToR and other relevant documents.

Key findings

The DST-NRF Centre of Excellence in Mathematical and Statistical Sciences (CoE-MaSS) was established on the 1st of April 2014 in order to integrate areas of research initiatives in the Mathematical and Statistical Sciences (MaSS).

It should be noted that the role of mathematics in Science, Engineering and Technology is hard to overestimate as, in fact, it can be broadly considered as the ‘language’ and often as a tool in these areas. At present days, it is impossible to establish a new technology without its preliminary modelling using mathematical methods. For instance, optimisation of technological processes always means their initial mathematical modelling. The national level of mathematics can be viewed as a marker for developing countries to be competitive with the developed countries. That is why the inception of MaSS in 2014 can be considered as a major effort of SA government and the NRF in developing the South African knowledge-based economy that is able to compete with the First World. Furthermore, the National Development Plan of SA places great importance on the improvement of Mathematics Education at schools right through to university level, whilst keeping in mind the pressing need to drastically transform race and gender representation in MaSS. The importance of high-level mathematical skills for the sustainable growth of the country's knowledge based on economy has been highlighted in numerous documents.

The CoE-MaSS is the group of numerous Node Institutions (at present - sixteen) comprising the vast research network that is believed to grow further in the future. CoEs are a mechanism for the DST, through the NRF, to fund research and postgraduate education in pre-specified MaSS research fields in South Africa.

CoE-MaSS embraces most of the major general fields in contemporary mathematics. In September 2016, after stakeholder meetings with Node Institutions, nine existing Research Themes Areas were ‘reengineered’ into eleven Focus Areas in order to adequately represent MaSS research and training. These Focus Areas are:

- Mathematics in Industry
- Algebra and Topology

- Statistical Theory and Applied Statistics
- Operator Algebras and Functional Analysis
- Number Theory
- Modelling and Analysis in Life Sciences
- Mathematical Physics
- Mathematics Education Research
- Machine Intelligence and Learning from Experience
- Symmetries, Mechanics and Applications
- Numerical and Applied Mathematics

The South African government, under the national DST, together with the NRF, initiated the DST-NRF Centre of Excellence model in 2004 in order for research to be aligned to its strategic national interests. As the CoE-MaSS was incepted much later, there was an opportunity to review the implementation of this goals in other Centres of Excellence and implement the corresponding findings in the CoE-MaSS.

The CoE-MaSS, starting with its inception addressed the concerns raised in the 2008 DSTNRF Review of the Mathematical Sciences through the generation of new knowledge, increased collaboration between Node Institutions and human capacity development taking into account racial and gender issues. This is helping in human capital development in the Mathematical Sciences that can have a significant impact on the development of a knowledgebased economy. The significant emphasis was on the Focus Area “Statistics” where significant lagging as compared to other countries (especially in ‘producing’ PhDs in this area) was observed. We see some progress, however, a lot should be done yet in this respect. On the other hand, significant successes were achieved in the CoE-MaSS Mathematics in Industry Focus Area via the interaction with local and international industry partners in solving industrial sector problems.

We concur that the initial proposal for the establishment of the CoE-MaSS has been implemented to a reasonable, satisfactory extent, as there are many objective hurdles in running such a big project. Besides, some specific features and requirements can change with time. For instance, the main focus in the proposal was formulated as:

“The main research focus of the centre will be under the theme 'Mathematics of the Earth and Environment.' Researchers will use the tools from their respective mathematical science disciplines to work collaboratively to solve problems that arise in the study of the earth and the environment. South Africa provides a unique environment in which to pursue high level study of processes that occur on the earth and in the environment.”

We think that although some of the Focus Areas are aligned with this topic, in general the Centre is aimed at broader applications of research.

We feel that the main and the most important success of the Centre is in developing the strong research environment and culture to uphold its objectives. Furthermore, a large number of bursaries were given to postgraduate students that resulted in substantial achievements in education and training. Lastly, the Centre had sponsored numerous conferences, workshops and other events that contributed greatly in dissemination of mathematical research, education of upcoming researchers and networking.

We are now referring in more detail to the description of achievements and results in KPAs. The corresponding shortcomings will be discussed later. The foregoing discussion is based on the Self-Assessment Report, the presentation of Prof. F. Mahomed and interviews and discussions with numerous stakeholders (see the Programme in the Annexure).

1. Research

There are numerous research projects conducted by active researchers and their postgraduate students in the frame of the CoE-MaSS. The peer-reviewed publications and the dissemination of knowledge via conference proceedings are considered to be the key outputs; however, the overall outputs are obviously broader. In terms of the numbers, 132 peer-reviewed publications were reported, which in our view is an *insufficient number* given the number of researchers and postgraduate students involved in the Centre. However, there are problems in reporting, which should be addressed in the future. In addition, as it was stated in the report, there was a breach in personal details (that was rectified by the NRF later) that caused researchers to be reluctant to report on the NRF system. The publications of the first two years (the stage of development) were mostly by the Director and the Deputy Director of the Centre (with collaborators). The pattern became 'more normal' in subsequent years when a large number of other researchers were also involved.

2. Education and training.

The CoE-MaSS has an active cohort of more than forty five postgraduate students and postdoctoral fellows supported by the CoE-MaSS each year working on research projects in the Centre's Focus Areas. The average gender distribution ratio across all CoE-MaSS awards over all four years is a 70% male / 30% female split. Most likely, it is due to the nature of mathematical science, where less women are involved. The average race distribution ratio across all CoE-MaSS awards over all four years is 80% black, 17% white, and 3% other groups. Education and training is also performed by the numerous conferences and workshops organized and sponsored by the CoE-MaSS.

3. Information brokerage and networking

Since 2015, the CoE-MaSS is maintaining the Research Seminar Series. These seminars are broadcast nationally on a weekly basis and allow researchers from all over the country to meet via a virtual system and discuss research matters and in some instances also give public talks.

We were also really impressed by the organization and impact of the Deep Learning Indaba, which has a pattern of a large conference with representatives from major institutions, including the Department of Science and Technology, major banks such as Standard Bank and ABSA, and those from technology industry including DeepMind, Google and IBM.

The Mathematics in Industry Study Group (MISG) contributes substantially to providing solutions both locally/internationally for various industry sectors. Information in the Technical Reports is provided to the various industrial sectors that pose problems to the MISG. The panel

stresses the variety and complexity of problems addressed by MISG and the perfect level of organization and governance, which can be an example for other projects.

The Science Spaza had exposure to 10,000 high school learners in 2018 and 3 newsletters designed by the CoE-MaSS researchers.

The Fame Lab competition has taught many CoE-MaSS postgraduate students and postdoctoral fellows how to articulate their research into short presentations.

4. Service rendering

Since 2015, the CoE-MaSS is broadcasting nationally its weekly research seminars that allow researchers from all over the country to meet via a virtual system and discuss research matters. It also broadcasts the Statistics Seminar Series.

The Centre has been involved in presenting public talks in various local South African languages on four South African radio stations to publicise MaSS research. The Mathematics in Industry Study Group provides service to industry in the form of solving the problems posed by local/international industry for their benefit.

5. Management of the CoE

The CoE-MaSS is hosted at the University of the Witwatersrand and the Director, Prof Fazal Mahomed, is a prominent applied mathematician working in the field of symmetries. The CoEMaSS is operationally located within the Wits Faculty of Science, and reports on operational matters to the Wits Dean of Science, on behalf of the Wits Deputy Vice-Chancellor: Research and Postgraduate Affairs. A Research Manager, Ms Caryn McNamara, manages the CoEMaSS with the help of Research Administrator and the Finance Officer (part-time). The provided documentation and overall description of the performance of the Centre shows that, given the funding constraints, the management is executed effectively and funds are distributed in the fair manner to different focus areas.

We have visited the site and were impressed by the facilities and venues in this unit. Apart from the convenient well-equipped meeting room and staff offices, there is a number of offices for short-term and long-term visitors.

Observed shortcomings

- The total amount of 132 peer-reviewed publications were reported by now, which in our view is an *insufficient number* given the number of researchers and postgraduate students involved in the centre. However, as it was stated, there are problems in reporting and that should be addressed in the future. The publications of the first two years (the stage of development) were mostly by the Director and the Deputy Director of the centre (with collaborators). The pattern became 'more normal' in subsequent years when a large number of other researchers were also involved.

- The establishment of the weekly seminar is a pivotal event for the dissemination of research results and ideas in MaSS, as mentioned by many stakeholders. However, its factual attendance at Wits CoE-MaSS has been recently very small.
- Although formally, due to “South African Statistics is in Crises”, the presence of Statistics in Focus Areas and events (e.g., occasional broadcast of statistical seminars) can be clearly seen, we did not get a clear picture of how the CoE-MaSS is involved in *statistical research* (apart from co-sponsoring of the SASA conference, some workshops on spatial statistics and funding postgraduate bursaries).
- It is not entirely clear why the Focus Area “Mathematical Physics” is in the frame of the CoE-MaSS as most of the mathematical physicists in SA are, in fact, theoretical physicists and the others could be definitely under the umbrella of applied mathematics.
- Numerous postgraduate students with whom we had discussions complain about the only one year bursaries without any guarantees on continuation. This makes it difficult for them to plan future education.
- Significant delays in funding of postgraduate students were reported (especially from UKZN).
- The Centre does not cover all important and well-developed topics in SA, for example, graph theory.
- The Centre attracts insufficient numbers of SA Masters and Doctoral students.
- The Centre has a very limited number of collaborators between the Historically Disadvantaged Universities.

Recommendations to the Centre (to improve performance)

- Most of the funding goes to postgraduate students and postdocs, whereas the amount left for individual researchers and for bringing in visitors is relatively small and spread over various universities. This becomes more dramatic with the phasing out of incentive funding for rated researchers. This issue should be taken into account in the forthcoming funding cycle.
- There is a concern in international collaboration that, at least, in some Focus Areas, most of the partners are from the Middle East and other developing countries. Therefore, this skewedness should be addressed.
- More activities were expected in the areas of mathematical biology, mathematical physics and statistics as compared with other Focus Areas.
- The student composition needs to be improved and more South African citizens need to be put through. More previously disadvantaged SA Universities should be involved in activities of the CoE-MaSS. Travel grants for postgraduate students and postdocs should be also implemented.

- The Centre needs greater visibility in particular to undergraduate students, as most of them are not aware of its existence. On the other hand, the postgraduate students already involved in the Centre, need more meetings where they can present their work and be able to network.
- The Mathematical community in SA did not immediately realize that this is the national and not the Wits Centre. Therefore, some of the areas were not covered, specifically the graph theory, where the UJ department of mathematics is strong. Overall, nationwide, the interaction of individual researchers with the CoE-MaSS is not sufficient and should be improved.
- The Centre has been successful in organising some workshops. However, this initiative should be broadened for getting people together and creating the culture of regular workshops.
- More control should be implemented on the funds timely reaching the recipients.
- The number of publications affiliated with the Center should increase in subsequent years due to the proper reporting and acknowledgements of those researchers and students who received the funding.

To the DST - NRF

- We strongly believe that for the benefit of SA mathematical sciences, the Centre should be funded, at least, for the next 5-10 years with a possibility (as suggested in the selfevaluation report) to become a National Centre of Mathematical Sciences. The latter will, obviously, depend on availability of a funding instrument to support such a global national initiative.
- For the next funding cycle, we would also recommend the increase in funding from the DST-NRF. We understand current monetary constraints. However, recently, due to phasing out of incentive funding for rated researches, considerable funds were set free and promised by the NRF to be used by other instruments. It will be most advantageous to the CoE-MaSS if a portion of these funds is used for the increase in its funding. A simple calculation shows that the corresponding annual release for mathematical sciences is around R13,000,000.
- Recommend to CoE-MaSS topical teams to envisage raising funds at the international level, e.g. from EMS-Simon's collaborations research grants.

Conclusion

The DST-NRF Centre of Excellence in Mathematical and Statistical Sciences (CoE-MaSS) was established on the 1st of April 2014 in order to integrate areas of research initiatives in the Mathematical and Statistical Sciences (MaSS). During nearly 5 years of its existence, it had achieved most of the goals set at its inception.

We feel that the main and the most important successes of the Centre are in developing a strong research environment and culture to uphold its objectives. Furthermore, a large number of

bursaries was given to postgraduate students that resulted in substantial achievements in education and training. The Centre had sponsored numerous conferences, workshops and other events that contributed greatly to dissemination of mathematical research, education of upcoming researchers and networking. On the other hand, the performance of the Centre can be, obviously, improved taking into account the recommendations of this evaluation report.

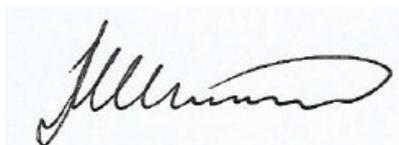
The student composition needs to be improved and more South African citizens need to be put through. More Historically Disadvantaged SA Universities should be involved in activities of the CoE-MaSS. Travel grants for postgraduate students and postdocs should be also implemented.

We strongly recommend that for the benefit of SA mathematical sciences, the Centre should be funded, at least, for the next 5-10 years with a possibility (as suggested in the self-evaluation report) to become a National Centre of Mathematical Sciences. The latter will, obviously, depend on availability of a funding instrument to support such a global national initiative. For the next funding cycle, we would also recommend and appreciate the increase in funding from the DST-NRF. We understand current monetary constraints. However, recently, due to phasing out of incentive funding for rated researches, the considerable funds were set free and promised by NRF to be used by other instruments. It will be most advantageous to the CoEMaSS if a portion of these funds is used for the increase in its funding.

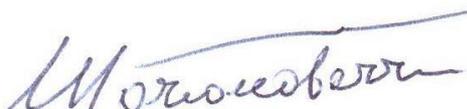
09.11. 2018



Prof. Maxim Finkelstein



Prof. Michael Shatalov



Prof. Mariano Torrisi



Prof Mahouton N Hounkonnou

Annexure

NATIONAL RESEARCH FOUNDATION (NRF) EVALUATION OF CENTRE OF EXCELLENCE FOR MATHEMATICAL STATISTICAL SCIENCES (MaSS)

PROGRAMME
18th to 20th September 2018

**VENUE: University of the Witwatersrand (Wits) (Pythagoras
boardroom - MSB, West campus)**

Name	Institution
Evaluation panel members	
Prof Maxim S Finkelstein	University of the Free State (UFS)_South Africa
Prof Michael Shatalov	Tshwane University of Technology (TUT)_ South Africa
Prof Mariano Torrasi	University of Catania_ Italy
Prof Mahouton N Hounkonnou	University of Abomey-Calavi, Benin Republic.
Assessor	
Dr Paulus L Masiteng	University of Johannesburg
Scribe	
Mrs Margaret Steyn	Noteworthy
NRF Officials	
Dr Rendani Ladzani Mr Nathan Sassman Ms Eulenda Mosese	

Day 1	Evaluation
Date	Tuesday 18th September 2018
Venue	University of the Witwatersrand (Pythagoras boardroom - MSB, West campus)
Time	Activities
8h00 - 8h25	Evaluators to proceed to the venue
8h30 - 8h40	Welcome and Conversation with the DVC, Wits_ Research and Postgraduate Affairs: <i>Prof Zeblon Vilakazi</i> Host institution management- WITS DVC Research and Postgraduate Affairs
8h40 - 8h55	Panel Chair - Introduction of the evaluation process and/or NRF:RE (Dr Rendani Ladzani)
9h00 – 10h30	Presentation by CoE Principal Investigator (PI) to the panel followed by the discussion: <i>Prof FA Mohamed represented by Prof. Bruce A. Watson (Wits)</i>
10h30 - 10h45	Tea/Coffee
10h50 - 11h15	Conversation with the Dean of the Faculty of Science <i>Prof Abraham Momoniat (Wits)</i>

11h20 – 12h00	<p>Conversation the Centre Manager, Management Committee, node leader(s)</p> <ul style="list-style-type: none"> • <i>Ms Caryn McNamara (MaSS Manager)</i> • <i>Prof Louis Labuschagne (NWU node leader)</i> <li style="padding-left: 40px;">✓ Operator Algebras and Functional Analysis • <i>Dr Michael Chapwanya (UP node leader)</i> <li style="padding-left: 40px;">✓ Modelling and Analysis in Life Sciences • <i>Mrs Yoko Chhana (Wits node leader)</i> <li style="padding-left: 40px;">✓ Subsidiary Partner: Institute of Certificated and Chartered Statisticians of South Africa
12h05 – 12h35	<p>Conversation Continues via Skype:</p> <p style="padding-left: 40px;">□ <i>Prof Bernardo Rodrigues (UKZN node leader)</i></p> <p style="padding-left: 40px;">✓ Algebra and Topology</p>
12h40 – 13h10	<p>Conversation with DST Senior Manager:</p> <p><i>Ms Rose Msiza</i></p>
13h10 - 13h40	<p>Lunch</p>
13h45 - 14h30	<p>Facility Tour (1)</p> <p><i>University of the Witwatersrand MaSS site area</i></p>
14h35 -15h20	<p><i>Conversation with the Doctoral students</i></p> <p><i>List attached (and the Attendance register)</i></p>
15h25 -15h30	<p>Tea/Coffee (working tea break)</p>
15h30 -16h30	<p><i>Conversation with the Masters students</i></p> <p><i>List attached (and the Attendance register)</i></p>

16h35 – 17h30	Conversation with Research Management <ul style="list-style-type: none"> • <i>Dr Christine Steininger (Wits)</i> • <i>Ms Casey Sparkes (Wits)</i>
17h35 – 17h45	Panel departs to the hotel
18h00 – 19h00	Panel Discussion

Day 2	Evaluation
Date	Wednesday, 19 September 2018
Venue	University of Witwatersrand : (Pythagoras boardroom - MSB, West campus)
Time	Activity
8h00 – 08h30	Arrival

8h30 - 09h25	Conversation with Post Graduate Students <i>List attached (and the Attendance register)</i>
09h30 – 10h00	Conversation with the Researchers (Focus Area Leader) <i>Mathematics Education Research</i> <i>Prof Delia North (UKZN)</i> Prof Vicky PA
10h00 – 10h30	Conversation with International Collaborators (<i>Skype</i>) <i>Prof Asghar Qadir via teleconference</i>

Time	Activity
10h30 – 10h55	<p>Conversation with the Industry Partner</p> <p><i>Prof Kerstin Jordaan (UNISA) nominated Prof Bruce Watson (Wits).</i></p> <p>Stochastic, Linear Processes and Number Theory focus area</p>
11h00 – 11h20	Tea/Coffee
11h30 – 12h00	<p>Conversation with Centre Reseacher (CoE- MaSS Focus Area Leader: Statistics) - Skype</p> <p><i>Prof Andriëtte Bekker</i></p>
12h05 – 12h30	<p>Conversation with the Researcher (CoE-MaSS International Visiting Researcher)</p> <p><i>Dr Christopher Angstmann</i></p>
12h35 – 13h00	<p>Conversation with the Science Engagement Collaborator</p> <p><i>Mr Robert Inglis</i></p> <p>Teleconference</p>
13h05 – 13h45	Lunch
14h00 – 14h30	<p>Conversation with the Community Engagement Collaborator</p> <p><i>Dr Belinda Huntler (Wits) – She will submit the report</i></p>
14h35 – 15h00	<p>Conversation with the Host for CoE- MaSS Postdoc in Gravitational Waves</p> <p><i>Prof Nigel Bishop</i></p>
15h05 – 15h30	<p>Conversation with the Collaborating Partner:</p> <p><i>Prof Barry Green (AIMS)-SU</i></p> <p>He is also listed under the Stochastic, Linear Processes and Number Theory</p>
15h30	Tea/Coffee (working tea break)
15h35 – 16h00	<i>Prof Driver (UCT) - Higher degree student mentor</i>

Time	Activity
16h05 – 16h30	Conversation with the Researchers (Focus Area Leaders) Numerical and Applied Mathematics <i>Prof André Weideman (SU)</i>
16h30 – 17h00	Conversation with the Collaborating Partner <i>Prof Hans-Peter Kunzi (UCT) Via</i>
17h00 – 17h30	Closed Panel Discussion
17h35 – 17h45	Panel departs to the hotel
18h00 – 19h00	Panel Discussion

17h35 – 17h45	Panel departs to the hotel
18h00 – 19h00	Panel Discussion

Day 3	Evaluation
Date	Thursday 20 September 2018
Venue	University of Witwatersrand : (Pythagoras boardroom - MSB, West campus)
Time	Activity
	Conversation with the Collaborating Partners: (<i>continuing</i>)
8h30 - 09h00	<i>Dr Andrew Craig (UJ).</i> <i>He also conveyed comments from Prof Farai Nyabadza (Biomathematics Research Group (Now at UJ)</i>
09h05 - 09h30	<i>Prof Maseka Lesaoana (UL)</i>
09h30 -10h00	<i>Prof Inderasan Naidoo (UNISA)</i>
10h00 – 10h30	<i>Prof Gary Sharp (NMMU)-</i>
10h35 – 10h45	Tea
10h45 - 11h15	<i>Prof David Holgate (UWC)-</i>
11h15 - 11h45	<i>Prof David Winston Garira (UniVen)</i>
	Conversation with the Subsidiary Partners
11h50 – 12h20	<i>(Dr Awni Abu-Saman)</i>
12h20 - 12h50	
13h00 - 13h35	Lunch
13h40 – 14h00	Conversation with International Collaborator continues (<i>Skype</i>) <i>Dr Celestine Wafo Soh</i>
	Conversation with the Researchers (Focus Area Leaders)

Time	Activity
14h05 - 14h30	Mathematics in industry
	<ul style="list-style-type: none"> • Prof David Mason (Wits) • Dr Ashleigh Hutchinson (Wits)
14h35 - 15h00	Symmetries, Mechanics and Applications <i>(formerly known as Symmetry Analysis and its Applications)</i> <ul style="list-style-type: none"> • Prof Sunil Maharaj (UKZN) – Teleconference • Dr Rivendra Narain
15h05 - 15h30	Mathematical Physics Prof Kevin Goldstein (Wits)
15h35 – 16h00	Machine Intelligence and Learning from Experience (MILE) and Logic and Computation <ul style="list-style-type: none"> • Prof Turgay Celik (Wits) : Also Logic and Computation • Dr Benjamin Rosman
16h05 -16h30	Number Theory Prof Florian L Luca (Wits)
	Closed Panel Discussion
17h00 - 18h30	Report writing at the hotel

End of evaluation.