TERMS OF REFERENCE

REVIEW OF MATHEMATICAL SCIENCES RESEARCH AT SOUTH AFRICAN HIGHER EDUCATION INSTITUTIONS

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1. Assignment title

Review of mathematical sciences[1] research at South African Higher Education Institutions (HEIs)

2. Background

The South African Mathematical Society (SAMS) is concerned about the state of mathematical sciences research at South African Higher Education Institutions (HEIs) given the importance of mathematical sciences in the development of a strong science base for the country and society in general. Society as a whole is currently dependent on mathematical sciences in various fields ranging from information technology to the life sciences and economic sciences. Strong quantitative skills have become key requirements in all science disciplines. The analytical ability to model large data sets, to develop and apply software as well as to understand and apply modern technologies has become imperative across all sciences.

The SAMS therefore approached the Department of Science and Technology (DST) to conduct a review of mathematical sciences research in South Africa and DST expressed its willingness to fund such a review.

3. Assignment principal

The Assignment Principal is the DST represented by the General Manager for Human Capital. The role of DST will be to:

- approve the terms of reference;
- approve the budget;
- approve the chair and members of the Review Oversight Committee (ROC);
- approve the convener and members of the international review panel nominated by the ROC; and
- receive the draft and final report by the review panel from the service provider.

[1] i.e. sub-disciplines commonly found in departments of mathematics, applied mathematics and mathematical statistics in South Africa excluding mathematics education

4. Service provider

The Assignment Principal will appoint a service provider to manage the review process. The service provider will be accountable to the ROC and its responsibilities will be to:

- develop the terms of reference for the review;
- appoint the approved chair and members of the ROC;
- appoint the approved convener and members of the international review panel;
- develop a programme for the review, including a budget;
- coordinate and manage the entire review process, including logistics;
- provide support to the review panel;
- source the necessary documents stipulated in the Appendix and make them available to the review panel four weeks prior to the commencement of the review programme in South Africa; and
- receive the preliminary and final report by the review panel and submit them to the ROC and DST.

5. Purpose of the review

The purpose of the review will be to:

- report on the status of research in mathematical sciences at South African HEIs;
- assess the application and innovation linked to mathematical sciences research conducted in South Africa;
- recommend key issues for consideration in the development of a strategy to improve research in mathematical sciences in South Africa.

6. Scope of the review

For purposes of the review, mathematical sciences are defined as those sub-disciplines that are commonly found in the Departments of Mathematics, Applied Mathematics or Mathematical Statistics in South Africa. The field of research on mathematics education will be included.

The review will focus on the present status of mathematical sciences research at South African HEIs in the context of developments over the last ten years and also on the short-term and medium-term future, i.e. the next five to ten years. It could also address long-term goals in the field of mathematical sciences to which the higher education sector should strive, if considered desirable by the panel.

7. Review dimensions

The review panel is requested to address the dimensions stipulated below:

7.1 The status of mathematical sciences research in South Africa in terms of:

- its status in the context of other academic disciplines in South Africa;
- its status compared to other countries; and

- resources available to support it;
- relevance (or lack of it) to the South African context.

7.2 The application and innovation linked to mathematical sciences research conducted in South Africa in terms of :

- findings by South African researchers in the field of mathematical sciences that generated benefits to society, e.g. applications in other fields, interventions that reflect international competitiveness, led to new discoveries, etc.

7.3 Researchers at South African HEIs in the field of mathematical sciences in terms of:

- number of active researchers and academic staff in mathematical sciences at South African HEIs, their qualifications and international standing;
- quantity and quality of the research outputs in mathematical sciences in South Africa;
- infrastructure at the disposal of researchers, e.g. computer facilities, journals, administrative support, etc;
- conditions of doing research at the HEIs (e.g. workload in terms of teaching, studying, research);
- funding opportunities for mathematical sciences research in the public and private sectors, academic institutions and/or any other donor agencies; and
- culture of using postdoctoral fellows in conducting mathematical sciences research at HEIs.

7.4 Capacity building in terms of:

- training of students in mathematical sciences at South African HEIs, in particular, at the honours, masters and doctoral level;
- financial support available for postgraduate student training;
- number of students at undergraduate and postgraduate level in terms of race, gender and nationality;
- throughput of students in mathematical sciences in terms of level, race, gender and nationality;
- infrastructure at the disposal of students, e.g. computer facilities, books, journals, administrative support, etc; and
- employment prospects for doctoral graduates in the field of mathematical sciences as well as further career development.

7.5 Future interventions in the field of mathematical sciences in terms of possible interventions to improve the:

- quality and quantity of research outputs in mathematical sciences in South Africa, i.e. interventions that are cost-effective, have been benchmarked internationally and support the National System of Innovation; and
- application and innovation linked to mathematical sciences in South Africa, i.e. interventions that generate wealth, demonstrate international competitiveness and support the National System of Innovation.

8. The review process

The overall review process will be supported by the ROC and the review will be conducted by an international review panel as outlined below:

8.1 Review Oversight Committee (ROC)

A Review Oversight Committee (ROC), comprising seven members, will be identified by DST. The ROC will be appointed by the service provider and will include the following:

- two representatives from industry and academia respectively, who are selected from members of the South African Mathematical Society (SAMS). One of the representatives will be the chairperson of the ROC;
- one representative of the Association for Mathematics Education of South Africa (AMESA);
- one representative of the South African Statistical Association (SASA);
- one representative of the DoE;
- one representative of the DST;
- one representative of the National Research Foundation (NRF).

Members of the ROC must be present at all their meetings or must be represented by alternates if they are unable to attend meetings.

The ROC will support the review process by:

- articulating the views of the mathematical sciences community;
- nominating members and the convener for the international review panel;
- advising on the terms of reference;
- advising on the work plan and time frames for the review process;
- suggesting suitable interviewees for the review panel;
- compiling a list of documents to be made available to the review panel which will be reflected in the Appendix of the terms of reference;
- meeting regularly under the direction of the chair of the ROC, as required;
- considering the final review report and making recommendations to the DST within eight weeks of receipt of the report.

Members of the ROC will not serve as members of the review panel.

8.2 International Review Panel

- The Service Provider will appoint the members and the convener of the international review panel approved by the Assignment Principal, i.e. DST. The review panel will comprise a minimum of seven members and will include:
    - four mathematical scientists from abroad, including one of whom shall be from Africa;
    - two South African mathematical scientists; and

- one other South African scientist from an associated discipline (e.g. industrial scientist, economic scientist, engineer, etc.)

The mathematical scientists on the panel should have experience in research policy issues as well as an international reputation in mathematical sciences research and diverse research, experience or work in or with mathematical sciences.

- The review panel will have the opportunity to:
  - interrogate the proposed programme and to recommend amendments and additions, should the need arise;
  - interview members of the ROC, staff and students of universities, science councils, relevant government departments and other stakeholders.
- The review panel will decide on and pursue its own line of questioning during interviews.

9. Deliverables

- Oral presentation by the review panel providing feedback to the Assignment Principal, the ROC and other interested parties;
- A preliminary report by the review panel submitted to the service provider upon completion of the stakeholder interviews;
- A final report submitted to the service provider within four weeks of completion of the review process including the following:
  - an executive summary;
  - background to the review;
  - evaluation questions that were addressed;
  - key findings;
  - specific recommendations on future priorities and interventions; and
- Placement of the final review report on the relevant websites after receipt of the recommendations from the ROC.

10. Time frame

The review will take place during 2008, depending on the availability of the service provider and suitable reviewers.

11. Budget

- The service provider will submit a budget for the review to DST for its approval.
- The costs incurred for the review will be covered by DST.

The terms of reference may be amended should the need arise.

Appendix

Documents for the review panel (names of documents and copies or URL to be supplied by the ROC and DST)

Essential reading

- Status report on mathematics research in South Africa (to be compiled)

Additional reading

- White Paper on Science and Technology
- South Africa's National Research and Development Strategy
- The Ten-year Plan for Science and Technology
- 2006 Annual Report of South African National Committee for the International Mathematical Union
- 2007 Annual Report of South African National Committee for the International Mathematical Union
- HEQC (Higher Education Quality Committee) Evaluative Study of Institutional Audits 2006, Sharman Wickham, Gonda Coetzee, Barbara Jones, Anthea Metcalfe, March 2007
- Human Capital and the South African Knowledgebase. A report to the National Advisory Council on Innovation (NACI) produced by CREST (Centre for Research on Science and Technology), University of Stellenbosch, in partnership with The Centre for Science and Technology Studies (CWTS), University of Leiden in the Netherlands, 2007
- OECD Reviews of National Policies for Education South Africa

http://www.fedusa.org.za/pdfdocs/Reviews%20of%20National%20Policies%20for%20Education_South%20Africa.pdf