Creating AIMS Centres across Africa

Background

Africa is all too often seen as the "basket case continent," plagued by corruption, war, poverty and disease, and a drain on the world's aid resources. Certainly, the continent has many problems, but it also has major human resources. All over Africa, there are bright, highly-motivated young people keen to acquire skills and education, and to contribute to their countries' development. Progress towards democracy and increased pan-African cooperation are bringing improved security and trade. To strengthen these developments, Africa urgently needs a community of highly-skilled individuals, creatively applying modern technologies to solve problems and to generate wealth.

Our Objective

To recruit Africa's brightest maths and science graduates, and to nurture their talent as independent problem-solvers and do-ers, creative, "outside-the-box" thinkers and excellent teachers. Among them will be people of rare

6-8 MELROSE ROAD | MUIZENBERG 7945 | SOUTH AFRICA
TEL: +27 (21) 787 9320 | FAX: +27 (21) 787 9321

talent capable of revolutionary advances, as scientists, educators, wealth-creators and leaders. Together they will form a powerful network working together towards African educational and economic self-sufficiency.

Our Strategy

Building on the experience and success of the African Institute for Mathematical Sciences (AIMS, see www.aims.ac.za) in Cape Town, South Africa, we are proposing to establish no less than 15 AIMS Centres within the next 5 years, distributed across the continent, delivering graduates with high-level creative maths and science skills, and excellent Masters and PhD degrees. We also plan to expand the curriculum to include business and entrepreneurial skills, leadership and public policy.

By publicly stating the objective of the programme to be the emergence of an "**African Einstein**", we are aiming for the highest levels of intellectual achievement and emphasizing our conviction that human talent of enormous potential is currently being wasted in Africa, capacity which is vitally needed for progress. Based on our experience at AIMS, we expect to discover a wealth of talent, with AIMS graduates proceeding to successful careers in academia, industry, and government.

The pan-African community at every AIMS Centre, and the strong links with other AIMS Centres, will act as a continual source of strength, pride, and commitment to African development. The focus on science and technology and on solving Africa's problems will help to overcome cultural and ethnic divides, so that AIMS graduates will form a powerful network working together for progress and peace across the continent.

AIMS in Brief

Since opening in September 2003, AIMS has been recruiting outstanding students from all over Africa for a unique, ten-month, highly intensive postgraduate programme teaching widely applicable math and computing skills and providing an exposure to many cutting-edge areas of importance and utility in the African context. Almost all AIMS students continue to a Masters or PhD, either at the six partner Universities (Cambridge, Oxford, Paris-Sud in Europe and Cape Town, Stellenbosch and the Western Cape in South Africa), or other high quality research institutions.

Over the past four years, AIMS has graduated 160 students from 30 African countries: a further 53 students are currently at AIMS, including 20 women, from 20 different African countries. The quality of the students has grown strongly, with over six applications currently being received for each available place. AIMS recruits from the best lecturers worldwide, and its innovative course preparing students for careers in science, industry or government, has gained widespread recognition, for example being featured in the leading science journals ***Nature***, ***Science***, ***Physics World***, *and* ***Physics Today***. AIMS graduates have an outstanding track record of proceeding to excellent Masters and PhD programmes, where they are already making an impact, in many fields.

AIMS has been recognized as a Centre of Excellence by the African Union (AU) and the New Partnership for Africa's Development (NEPAD) and won major ongoing support from the South African Ministries of Education, and Science and Technology.

Expansion of AIMS and AMI-Net

Based on these successes, and with encouragement from NEPAD and the AU, AIMS has been developing plans to expand. Indeed, as the first AIMS graduates are receiving their PhDs, such an expansion is now essential in order to provide opportunities for AIMS graduates, and other promising young African scientists, to continue their scientific careers in Africa.
Over the past three years, AIMS and its partners across Africa have developed a proposal for an African Mathematical Institutes Network (AMI-Net), which was incorporated last year into the NEPAD/AU Consolidated Plan of Action for Science and Technology (see www.nepadst.org). AMI-Net is governed by Council of distinguished African and international scientists, and AIMS acts as its Secretariat. Following a call for proposals, a series of site visits have been held, with full business plans developed for AMI-Net nodes in Ghana, Madagascar, Sudan and Uganda. Nodes are also being explored in other countries, including Botswana, Egypt, Ethiopia and Rwanda. Each identified site has excellent human and natural resources, and good prospects of developing into a Centre of Excellence which the local population, universities and government will be proud of. The conference of African Ministers of Science and Technology held in Mombasa, in November 2007, called on AIMS to submit a comprehensive implementation plan.

The leading proposers of AMI-Net Centres have each proposed that their Centres be named as AIMS (Ghana), AIMS (Madagascar) etc. Therefore, the opportunity to grow AIMS as a fully coherent, pan-African institution has now emerged.

AIMS (Abuja)

In a parallel development, AIMS has formed a close partnership with the African University of Science and Technology (AUST), due to open in July 2008, in Abuja, the Nigerian capital. AUST's founding element is a postgraduate centre for Mathematics and Computational Science, which will open on roughly the same scale as AIMS in Cape Town. It has been agreed that the centre will become known as AIMS (Abuja).
AUST was initiated as a World Bank project, co-funded by the African Development Bank, and Nigerian federal and state governments. AIMS and AUST have been operating in close partnership to recruit students and lecturers. AUST has a strong engineering focus, including petroleum engineering (with the Gulf of Guinea institute now under construction), materials science and computational science. AUST plans eventually to develop its large campus into an MIT-style University, with around 5,000 undergraduates.

AIMS and AUST plan to collaborate closely on the AIMS rollout and in particular on a joint proposal to the African Development Bank in early 2009. Each new AIMS institute will be operated as a partnership project between AIMS in Cape Town, AIMS (Abuja), and a consortium of one or more local Universities, with ring-fenced funding and full accountability to the AIMS organisation. Every institute would host students from all over Africa, but would focus on a particular set of mathematical sciences disciplines. The students' shared scientific interests will help overcome cultural and language differences and strengthen relations between their countries. Some of new AIMS centres may develop over time into full AUST campuses: AUST has a target of four such campuses across Africa. Hence the expansion of AIMS can serve as a pilot programme for the expansion of AUST.

Our strategy to retain talent in Africa

It is essential to the long term success of the programme that once AIMS graduates have completed their PhDs there are opportunities made available for them to remain in (or return to) Africa. Each AIMS Centre will have to work to create a network of opportunities for its graduates, serving as

1. faculty and researchers at new AIMS Centres, or other Universities in Africa,
2. employees of pan-African or local companies operating in partnership with AIMS to create career opportunities,
3. employees of development agencies and other NGOs, and African governments in need of skilled African graduates,
4. mathematical modelling consultants, providing evaluation and forecasting services for government ministries, businesses, NGOs and aid agencies,
5. entrepreneurs engaged in business start ups including mathematical consultancy firms.

The total output, of 750 highly qualified graduates every year, will create a step change in the high-skills community in Africa.

In addition, to further enhance the opportunities available for AIMS graduates, we plan to expand the current AIMS curriculum to include:

- entrepreneurship, business and industry-specific skills,
- leadership, policy and governance skills,

so that students with aptitude can move into these areas. We will also work to obtain placements with partner

companies to ensure the successful placement of students post-AIMS.

In the long run, we would like each AIMS centre to serve as an innovation hub for its region, just as the Indian Institutes of Technology (IITs) did for the IT industry in India, or Stanford University did for Silicon Valley in California.

Each AIMS Centre should also run a schools outreach programme, like the successful AIMS Schools Enrichment Centre (AIMS-SEC) which runs 3-week in-service training courses for maths and science teachers from all over South Africa.

Funding requirement

We seek to raise an endowment to fully and permanently support 50 students per year at each of the 15 AIMS centres. The endowment will be centrally managed and invested, with its income drawn on and distributed as student bursaries.
The cost of each fully-funded student bursary, covering travel, subsistence, accommodation and medical insurance is around $10,000 per annum, or approximately one fifth of the cost of supporting an African student in Europe or the US. Every AIMS Centre would therefore require an income of around $500,000 per annum in scholarship funding. Such an income would be earned on an endowment of $10 million per AIMS centre. Hence we reach a figure of approximately $150 million, built up over five years, to permanently support 15 AIMS centres. This sum, although large, represents less than one per cent of the aid now given ***annually*** to Africa, yet it would be permanent, highly cost-effective investment in Africa's future:

- AIMS graduates will help to fill the current acute shortage of qualified staff in African Universities and raise the level of teaching in mathematical subjects, directly impacting hundreds of thousands of undergraduates and, through teacher training programmes, millions of schoolchildren.
- The AIMS institutes will also have as a major goal contributing to the financial success of the host country, so industry and government will benefit significantly from this new talent pool.

With the raising of an endowment of $10 million per AIMS centre, we will seek to leverage matching funding from local sources, including government and Universities, as AIMS has done in South Africa, from local philanthropic sources, from the African Development Bank and other pan-African and international development agencies, so that the running costs of each institute (staff salaries and teaching costs, utilities, equipment, maintenance) are fully and permanently covered.

Progress update

Since the TED conference at the end of February, 2008 (see www.ted.com) where the African Einstein/AIMS rollout TED wish was launched, over 2.7 million dollars has been committed by private, corporate and charitable donors, principally for

- providing grants to support AIMS scholarships and endowed scholarships,
- supporting the creation of the AIMS rollout team,
- supporting the creation of the new AIMS Research Centre focussed initially on programmes in biomathematics, financial mathematics and astrophysics, to be funded by the South African Department of Science and Technology,

- supporting an endowed staff position for schools outreach, at AIMS.
- providing computers to AIMS

A top US website designer, Avenue A/Razorfish, has developed a website, www.nexteinstein.org, which will spread worldwide awareness of the initiative, and receive individual donations.

The following high-profile individuals have offered supporting statements and videoclips, and help in connecting AIMS with potential donors, including:

- Paul Kagame
- Bob Geldof
- Stephen Hawking
- Lord Martin Rees
- Forest Whitaker
- Mark Shuttleworth

The following corporate partners have expressed a strong interest in supporting the AIMS rollout, in various ways from funding scholarships and computer hardware, to management training, accounting/auditing, connecting to local offices and other corporate partners etc:

- Barclays/ABSA
- Price Waterhouse Cooper
- McKinsey
- The Virgin group
- SUN Microsystems
- New Star Investments

The following philanthropic foundations, scientific societies and institutions have made recent major commitments to AIMS, and the AIMS rollout

- Ford Foundation
- Arcadia
- Victor Rothschild Memorial Fund
- Vodafone Foundation
- Nokia Foundation (Africa)
- Institute of Physics (UK)
- London Mathematical Society

Summary

Existing aid strategies have neglected the importance of developing a highly skilled community in Africa. Over the last forty years, a trillion dollars in aid has been given, without lessening the need for more aid. It is time to invest some of that aid in developing Africa's most capable people, so that **Africans can solve Africa's problems and generate wealth for the continent**.

The Next Einstein from Africa programme will draw many brilliant young Africans into maths and science, giving them the knowledge, high level skills and self-confidence they need to help Africa. Among them, no doubt, will be people with rare creative genius who will make breakthroughs in science. There will also be excellent teachers, spreading knowledge to the huge population of students on the continent, and great technologists and entrepreneurs – the African Gates, Brins and Pages, capable of permanently changing Africa's economic fortunes. And there will be a growing community of well-connected and well-informed people capable of taking the continent forward to peace and prosperity.

Supporting Statements

"I have been delighted to see the progress of the African Institute for Mathematical Sciences (AIMS). In record time it has built a reputation for excellence, innovation and a true spirit of pan-Africanism. The global recognition it has earned is well-deserved, and I consider it a model for the development of mathematics and science in Africa. The Next Einstein initiative, which seeks to establish AIMS Centres all over Africa, is an inspirational programme which I strongly support. This simply must happen."

- His Excellency Paul Kagame, President of Rwanda

"This institute will bring Africa to the cutting edge of science. Those were my words five years ago, when I learned of the ambitious plan to create AIMS. The progress made since then has been startling. AIMS is now generating a stream of well-prepared students entering many advanced areas of science. The Next Einstein plan, to create AIMS centres all over Africa, is even more exciting. Its implementation will have a major impact on Africa's development. Not only will this be vital for the continent, I believe it will be important for the future of science because science needs Africa's talent. I am keenly looking forward to meeting prospective young Einsteins from Africa."

- Stephen W. Hawking, renowned cosmologist

"These flagship institutes could help kick-start a scientific boom in Africa and are an extraordinarily cost-effective step towards achieving this goal."

- Lord Martin Rees, Master of Trinity College, Cambridge, Astronomer Royal and President of the Royal Society, UK

"AIMS is a remarkable achievement and an example of what can be done. I strongly support the plan to create many AIMS centres across Africa."

- Mark Shuttleworth, first African in space and free software pioneer.

"I am very impressed with AIMS and how it is enabling students from all over Africa to study together and to enter high level math and science. The NextEinstein program to create many AIMS centers across Africa is an important initiative which I strongly support. The AIMS graduates are an inspiration for Africa and for the world. Peace and light."

- Forest Whitaker, renowned actor.

"I am proud to be a supporter of AIMS since its inception, in 2003. Its progress since then has been simply astonishing. AIMS is now a proven model of how talented young Africans can be enabled to become successful researchers, contributing at the cutting edge of science and technology, in Africa. The Next Einstein initiative is a visionary plan which deserves support at the very highest level. If implemented, it will have a major impact, not just on maths and science, but on African development in general."
- Hon Mosibudi Mangena, Minister of Science and Technology of South Africa