

Workshop to Plan a
Regional Initiative for Science and Education (RISE)
Nairobi, Kenya
June 4-5, 2007

The African Academy of Sciences (AAS) and the Science Initiative Group (SIG) at the Institute for Advanced Study (IAS) convened a two-day workshop, sponsored by Carnegie Corporation of New York, to plan an African Regional Initiative in Science and Education (RISE). The workshop brought together scientists, educators, administrators, government officials, and development experts from Africa and abroad to help shape the initiative.

Workshop goals were several-fold: to confirm demand for a regional initiative; to determine priority scientific and/or problem-focused areas; to coordinate with related and complementary initiatives; and to explore avenues of support from foundations, development banks, and potential partner organizations. Specific, short-term deliverables will be a proposal to Carnegie Corporation for funding for a 3-5 year demonstration phase and a draft Request for Proposals that details the selection process and criteria.

RISE is being designed to develop human capacity through science and technology training and research in a regional context, enabling individuals to use S&T to contribute to national and regional economic development. RISE, with its focus on training through rich and varied exposure to facilities and expertise in multiple settings, will complement initiatives that focus on strengthening universities, research centers, science academies, and other institutions.

The first part of the workshop was devoted to introductory remarks and a series of presentations providing background and context for RISE. These are summarized briefly below, and PowerPoint presentations and background documents are available on the SIG website at www.msi-sig.org/rise.html. The second part of the discussion concentrated on the design of RISE and is summarized beginning on page 7. A participant list can be found on the final page.

Welcome, Background, and Context

Shem Arungu-Olende and *Stephen Agong* gave opening remarks on behalf of the African Academy of Sciences, and *Samuel Oreta* of the Ministry of Science and Technology of Kenya read a statement from Minister Noah Wekesa, who was unable to attend.

Phillip Griffiths, SIG Chair, provided background on the origin of the RISE concept and explained the goals of the workshop.

Carnegie Corporation of New York, one of six foundations that comprise the Partnership for Higher Education in Africa (PHEA), recently approached SIG at the Institute for Advanced Study about developing a program to build S&T capacity in Africa. An ensuing series of discussions led to the concept for a Regional Initiative in Science and Education (RISE), to be implemented in several phases. Stakeholder input into project design was the objective of the Nairobi workshop, which will inform a proposal to Carnegie Corporation for a 3-5 year demonstration phase. It is anticipated that RISE subsequently will be scaled up through participation of the World Bank and perhaps the African Development Bank, both of which are

exploring avenues for regional support for S&T; potentially other donors; and African governments, whose involvement will be essential for the long-term sustainability of RISE.

With its emphasis on human capacity building through research and training in S&T, RISE is meant to complement a number of ongoing initiatives that focus on strengthening institutions and developing infrastructure.

Part of the impetus for the proposed RISE was the near-unanimous response by 17 African university vice chancellors participating in a PHEA-sponsored forum in Cape Town, South Africa, in November 2006 to a question about what their universities needed most. The vice chancellors said that above all their need was for people: well-qualified faculty to teach, conduct research, and help strengthen the universities.

The three main assumptions for RISE are that it will focus on people, it will be regional, and it will involve a competitive selection process. However, all of these are subject to discussion and modification, as Carnegie Corporation and SIG recognize the importance of stakeholder input into decision making.

Sonia Plaza, who is responsible for regional initiatives in the World Bank's Africa region, spoke on **The World Bank and Regional Initiatives in Africa**.

The World Bank has been a latecomer both to S&T and to the regional approach, especially in Africa. Until recently, education for all was emphasized over higher education and science, technology, and innovation. An IDA pilot program for regional integration that began in 2003 initially emphasized infrastructure and only in the past two years has shifted its strategy to building skills for competitiveness. In both cases, shifts have been in response to demand from the countries and in recognition that African firms cannot compete without skills for competitiveness. Two recent documents lay out Bank strategies: the Africa Action Plan and the Capacity Development Management Action Plan (CDMAP). Currently under development is a Regional Integration Assistance Strategy (RIAS), one of whose principal pillars will be strong attention to human development and capacity building.

The Bank also has looked to the potential of the Diaspora community to serve as bridges to contribute to Africa's development. The African Institute for Science and Technology (AIST), a major regional initiative now in preparation, could bring back Diaspora faculty temporarily or even long-term for teaching, research, and collaboration with African colleagues.

Also of interest to the Bank are establishing university/industry linkages to develop skills in specific areas; mitigating brain drain (or enhancing brain circulation); and learning lessons from other countries, perhaps through South-South networks.

Most World Bank loans and grants are given to single countries, and instruments for regional support are limited. Regional IDA support involves separate funds for each participating country. The Bank is trying to develop a new instrument to enable it to lend directly to regional organizations.

The Bank would like to build on catalytic initiatives and sees the potential for RISE to be one of these.

Lamin Barrow, representing the African Development Bank (ADB), observed that the forum comes at a critical juncture in the context of efforts to revitalize higher education in Africa and link higher education, science, and industry. The ADB has recently completed its Higher Education, Science and Technology (HEST) strategy premised on three strategic pillars: building infrastructure for HEST, linking HEST and the productive sector, and supporting HEST institutional reforms. HEST is assuming a more important role within the ADB, as reflected in its new organizational structure, which includes a dedicated division for HEST within the Human Development department.

John Mugabe of NEPAD was unable to attend the workshop but provided for discussion a draft *Report on the Implementation of Africa's Science and Technology Consolidated Plan of Action (CPA)*, which outlines progress since the plan was endorsed by the African Ministerial Conference on Science and Technology (AMCOST) in 2005. The programs contained in the CPA are being implemented through regional networks of centers of excellence, each consisting of a hub and nodes, and all falling within one of five NEPAD program clusters: biosciences; energy, water, desertification; material sciences, manufacturing, laser, post-harvest technologies; space sciences; and mathematical sciences. While all areas have been endorsed by NEPAD and AMCOST, and African states have affirmed their commitment to increase funding for science and technology to reach a 1% GDP target by 2010, the status of funding and implementation of the programs varies.

Experiences and Perspectives on Regional Training Initiatives and S&T for Development

These presentations provide context for RISE and explore avenues for cooperation and synergies, as well as lessons from experience.

Overview and Analysis of African Regional Networks: Summary of a Report for the Partnership for Higher Education in Africa

Katherine Namuddu, Rockefeller Foundation

A study on African networks was commissioned by the Partnership and conducted by consultant Jeffrey Fine. The study's survey of existing networks and its analysis of characteristics of a successful network will help inform the development of RISE.

Role of Universities in Regional Training and Research

John Ssebuwufu, Association of African Universities (AAU)

Universities already play a major role in research and teaching and to some extent regional training through networks and consortia. There is strong potential for further university involvement in regional initiatives. A potential pitfall is donor dependence and a consequent risk of unsustainability. AAU is at the forefront of promoting regional networks in research and training.

The African Science Academy Development Initiative (ASADI)

John Boright, US National Academy of Sciences

ASADI, designed to strengthen the capacity of African academies of science to meet societal needs by providing evidence-based advice to government policymakers and national stakeholders, is available as a resource and ally in the establishment of RISE.

The Role of Science Academies in Promoting Science Education Programmes in Africa

Paul Mugambi, Uganda National Academy of Sciences

Uganda's National Academy of Sciences was one of those selected to receive support from ASADI. Science education is among the Academy's programs, and the Academy has been deeply involved in the development of the Millennium Science Initiative in Uganda.

The Role of Private Sector in Building Capacity – Cisco Networking Academy Program

Hital Muraj, Cisco Networking Academy

CISCO takes advantage of the growing power of the Internet to support a "human network," where instructors, staff, and students around the world are taught computer skills relevant to today's market.

Rwanda Government Perspectives on Science and Technology for Development

Mike Hughes, Rwandan Ministry of Education, Science, Technology and Scientific Research

The Rwandan government has made a high-level commitment to strengthen science, technology, and innovation – all virtually nonexistent in 1994. The country's STI policy focuses on capacity building in four key areas: knowledge acquisition, knowledge creation, knowledge transfer, and innovation culture and entrepreneurship. The government is working closely with the World Bank to develop a national policy relevant to Rwanda's needs. Rwanda could both contribute to and benefit from regional initiatives through sandwich programs, industrial internships, participation in research networks, and other programs.

World Bank Observations on Building STI Capacity For Development

Al Watkins, The World Bank

The World Bank has begun to view scientific capacity building holistically, with elements including creation of new knowledge through research and development, and building of capacity to utilize knowledge available elsewhere. This requires a scientifically trained workforce at all skill levels. Finding practical solutions to practical problems requires adopting a cross-sectoral approach that brings together many ministries and sectors and utilizes technology skills from low-tech to high-tech, vocational to sophisticated engineering.

To implement this multi-dimensional approach, the Bank is developing needs assessments and action plans, including a pilot program currently underway in Rwanda. Mozambique, Uganda, Kenya, Mauritania, Mauritius, and Ghana all are engaged in or contemplating similar exercises in partnership with the Bank and/or UNCTAD. This new integrated model is in contrast to the Bank's traditional mode of operation, which tends to isolate sectors from one another.

Building Scientific Capacity and Expanding Research Opportunities through Regional Linkages in Africa: The Federal Government of Nigeria Perspective

Turner Isoun, Federal Ministry of Science and Technology, Nigeria

The Nigerian government recognizes that building science, technology, and innovation (STI) capacity is critical for long-term development, and that tertiary education and research institutions have a central role to play. The federal government has put in place programs to restructure the STI infrastructure and streamline research agencies to remove overlap. Nigeria also holds an annual Diaspora conference to help make productive connections with talented émigrés.

Networks will be sustainable only if they have some support by African governments in the form of funding or provision of facilities. It also will be crucial to focus on training for indigenous capacity building rather than for export; thus institutional capacity, facilities, and projects must be in place to encourage those trained through RISE to remain in the region. Nigeria has the capacity to absorb RISE graduates into universities, colleges, polytechnics, and research institutes, as well as agencies of the Federal Ministry of S&T.

The Nigerian government is working to build a science endowment of \$5 billion. If successful, this fund could factor into regional programs.

Lessons from Some African Regional Networks

Leaders of a sampling of African regional networks were invited to describe their initiatives and make observations and suggestions about lessons learned that could be applied to RISE.

African Mathematics Millennium Science Initiative (AMMSI), *Wandera Ogana*

The goal of AMMSI, a network of individuals in existing institutions, is to nurture the next generation of mathematical leadership. AMMSI's regional approach to mathematics training allows students and researchers to work in multiple academic settings, where they are exposed to a variety of disciplines. This is valuable in a region that lacks a critical mass of mathematicians in any one university or even country. Through AMMSI, researchers are encouraged to use mathematics as part of a multidisciplinary approach to address local issues. AMMSI recognizes the need to involve individuals from other disciplines.

AMMSI's initial funding from the Mellon Foundation, used primarily for fellowships, scholarships, and conferences, has led to additional grants from a number of sources that have enabled AMMSI to expand its programs to include mentorships, international joint research projects, and longer collaborations. AMMSI soon will begin operating as an autonomous program of the African Academy of Sciences.

Although AMMSI already has had an impact on the professional careers of a number of mathematicians, it could do much more. In the future, AMMSI would like to be able to expand its programs and its reach, award larger scholarships, strengthen its secretariat and make it bilingual to improve anglophone/francophone interactions, improve communication with grantees, and streamline cumbersome fund transfer processes.

Forum for Agricultural Research in Africa (FARA), *Aissétou Yayé*

Established in 2002 by three sub-Saharan African research organizations, FARA enjoys a continental mandate and is supported by NEPAD and the African Union. Its mission is to enhance and add value to the African agricultural research system. FARA's initiatives focus on strengthening institutions rather than individuals. FARA plays a major advocacy role for Africa's research and development.

FARA has five principal functions: advocacy and resource mobilization, access to knowledge and technologies, regional policies and markets, capacity strengthening, and partnerships and strategic alliances. Within each of these functions, FARA carries out one or two initiatives. For example within capacity strengthening, FARA conducts the SCARDA program, funded by the UK Department for International Development, to strengthen institutional and human capacity for agricultural research, generating outcomes for economic growth, wealth creation, poverty reduction, and increasing the number of women in the field.

International Institute for Water and Environmental Engineering (2iE)/AIST, *Amadou Hama Maiga*

Specializing in water resources and the environment, 2iE, based in Ouagadougou, Burkina Faso, will become a specialty institution of AIST. AIST will provide world-class training for African engineers in an African environment so they are able to address African issues. 2iE, well known internationally, is already a successful institution that offers bachelors and masters degrees and post-graduate programs and has strong connections both within and outside Africa.

2iE attributes its success to merit-based academics, collaborations with highly ranked universities and research centers, the presence of world-class visiting researchers, regular program updates, diversification of funds, and the absence of political dependence on any country.

Network for Analytical and Bio-Assay Services in Africa (NABSA), *Berhanu Abegaz*

Begun in 1992 in Gaborone, Botswana, NABSA promotes intra-African cooperation in chemical sciences, especially analytical chemistry and natural products chemistry. NABSA has established arrangements that allow access to the NMR and MS facilities of the University of Botswana to scientists in 12 African countries. Over 8,000 measurements have been made during the last six years. The major beneficiaries are Cameroon, Tanzania and Nigeria. A unique feature of the NABSA services is the setting up of remote workstations (based on licenses attached to the spectrometers in Botswana) in two universities in Dschang (Cameroon) and Dar es Salaam (Tanzania), which allow researchers including students in their home institutions to process raw data generated on their samples in Botswana. NABSA also offers short visits for researchers from these countries. This mode of cooperation has resulted in the training of several PhDs and numerous publications in peer-reviewed journals.

The NABSA model shows that networks can be cost effective and efficient and are viable mechanisms for enhancing higher education. NABSA attributes its success in part to the fact that it is driven by active scientists who benefit from collaborative research.

African Forest Research Network (AFORNET), *Iba Kone*

AFORNET is a network dedicated to forestry education and training in sub-Saharan Africa. Established to address declining performance and outputs in forestry education, training, and research institutions, AFORNET has identified a number of issues, lessons, and interventions. Among AFORNET's goals is to create a sustainable critical mass of expertise in forestry research through restructuring of fragmented research institutions, establishment of linkages and networks at the national, sub-regional, and regional levels, and facilitation of resource sharing for effective collaborative research.

International Centre for Insect Physiology and Ecology (ICIPE), *J.P.R. Ochieng'-Odero*

ICIPE offers an African regional post-graduate program in insect science. Consistent with the goals outlined for RISE, ICIPE builds capacity to deal with emerging issues on the African continent.

Inventing RISE

In a lively and engaging discussion on the second day of the workshop, participants unanimously and enthusiastically endorsed the concept of a regional initiative in science and education. The group deliberated in depth about what target areas and structures would make RISE most effective in terms of both absolute value to the development of research capacity in sub-Saharan Africa and value added to other existing and planned initiatives. The summary that follows breaks the discussion into six parts: 1. demand; 2. priority areas; 3. structure and process; 4. costs; 5. complementarity, partnerships, and leverage; and 6. the way forward.

1. Demand for a Regional Initiative in Science and Education in Sub-Saharan Africa

Mohamed Hassan, president of the African Academy of Sciences and executive director of TWAS, opened the discussion session with some sobering statistics about the challenges facing sub-Saharan Africa, the most impoverished region of the world, with 100 million chronically poor people. Africa's major issues – inadequate access to clean drinking water, staggering numbers killed by malaria and HIV/AIDS, vulnerability to climate change – demand science-based, home-grown solutions. But the scientific output from sub-Saharan Africa is minuscule; a mere .82% of the world's scientific publications come from that region. Africa urgently needs to improve the quality of its scientific research and create a culture of scientific excellence.

The Millennium Science Initiative (MSI) in Africa has made small inroads. AMMSI, the African Mathematics MSI, is a small but thriving network of excellence. Like RISE, the MSI came about as a result of extensive consultations among Africa's scientific leadership, co-organized by SIG, AAS, and TWAS. The NEPAD-endorsed, CIDA-financed biosciences network, whose hub is ILRI in Nairobi, follows the AMMSI network model.

The case for a new regional initiative was made by a number of meeting participants, who collectively were familiar with a variety of successful – and not so successful – regional efforts. There was strong consensus that in the absence of a critical mass of experts in any one scientific specialty or disciplinary focus area in most countries in sub-Saharan Africa, a regional effort will be required to provide adequate training to prepare African students to bring science-based solutions to local problems. In an approach that sets it apart from other human capacity building initiatives, RISE will focus especially on preparing students at the MSc and PhD levels who will

remain in the university system to conduct research and teach future generations of problem solvers.

2. Priority Areas

While consensus was reached quickly that priority areas for regional initiatives should be selected in advance, among other reasons for the practical one of controlling the number of proposals and the range of reviewer expertise required, a substantial part of the discussion centered around determining what those priority areas should be. There were equally compelling arguments for a focus on traditional disciplines such as mathematics and chemistry and on problem areas involving an interdisciplinary approach; examples given were renewable energy and safe drinking water.

The principal arguments in favor of basic sciences were that Africa is generally weak in these areas and their development is critical for providing a solid underpinning for applications and innovation, and that networks would be a boon to scientists, who typically work in isolation. On the other side, it was argued that solving problems requires expertise in multiple disciplines and at a range of levels, and that capacity should be developed across the spectrum to enable Africans to resolve the continent's issues, directly linking knowledge to action.

In the end a decision was reached to target both basic and applied areas, identified based on their potential to help Africa and on the relative lack of current support in those areas. Although proposals in any field of science or any problem area would be considered, priority would be given to the following:

Basic sciences: mathematics; materials; natural products.

Applied/interdisciplinary areas: renewable energy; safe drinking water; information and communication technologies with an emphasis on software engineering.

3. Structure and Process

RISE will be a regional initiative for sub-Saharan Africa focusing on human capacity building, consisting of training networks in some or all of the disciplines and areas identified above. Its primary emphasis will be on training people from the region to teach in universities, although some RISE graduates may choose careers where they can apply their skills directly.

A wide-ranging discussion led to the following provisional conclusions about the form the RISE networks should take and about the selection process. These details will be refined and perhaps modified in the course of preparing the proposal to Carnegie Corporation and the Request for Proposals for RISE networks, both of which will be drafted in consultation with the workshop participants.

Hub and nodes: Each RISE network will comprise a central, university-based hub with perhaps five or six nodes to start, with flexibility to add nodes as the project evolves. The nodes that receive support should all be based in sub-Saharan African countries and may be located in universities, research institutions, government research agencies, or other settings where scientific research and training take place. Additional linkages with universities and research

institutes outside of Africa will be strongly encouraged. The objective will be to provide students with a comprehensive training program, where they receive their degrees from any one of the degree-granting institutions in the network but spend periods of time at other institutions that can provide complementary instruction and research opportunities.

Selection process and criteria: Proposals will be accepted from leaders of network hubs and should be comprehensive, including descriptions of the relationship among the hub and nodes, a plan to motivate the nodes to participate actively in the network, and an outline of research and training activities. Both existing networks looking to expand and new networks will be eligible. (Individual students would apply at a later stage directly to the hub or node for support.) Proposals will be considered in an open, transparent, competitive process. Selection committee members will include experts in relevant fields from Africa and abroad. Priority will be given to the selected target fields, but proposals from any scientific area will be considered if a strong case is made for their inclusion. Selection criteria will include scientific merit, training capacity, research activities, evidence of institutional support, added value of the network versus separate support to individual institutions, potential for sustainability, and in the applied areas, preparedness for innovation. Evidence of government support of the local nodes will be an advantage. Outstanding leadership will be critical. Geographic diversity, gender balance, university/industry linkages, and community outreach all will be taken into consideration.

Mitigating brain drain: It was well recognized that providing advanced scientific training without at the same time supporting universities and research institutions would only exacerbate the brain drain problem. RISE will address this in several ways. First, it will train students to teach in the universities, thereby strengthening those institutions and making them more appealing. In addition, it will work closely with the Partnership for Higher Education in Africa and other initiatives designed to strengthen universities to ensure efforts are complementary. It will also draw on successful models such as the University Science, Humanities and Engineering Partnerships in Africa (USHEPiA), a sandwich program based at the University of Cape Town that offers fellowships for students from the region to study in South Africa and provides additional financial support when they return to their home institutions.

4. Costs

The initial assumption informing the workshop discussion was that RISE would support three or four networks at a cost of \$250,000 per year for a minimum of three years, with a two-year renewal possible after a successful interim evaluation. These figures were based on the research done by Jeffrey Fine for the Partnership for Higher Education in Africa. However, it became clear in the course of the discussion that networks with the objective of training a critical mass of MSc and PhD students would be more expensive.

Revised figures were reached based on the following factors:

- A “critical mass” in any one area would require a minimum of 20 students with MSc or PhD degrees.
- An MSc degree could be completed in 2-3 years; a PhD in 3-5.
- The cost of training a student in Africa varies tremendously according to country and field, but a rough average of \$15,000 per student per year was reached. This was based on numbers provided by many of those present (from a high of \$20,000 per student per year for a highly

technical subject at the University of Pretoria, to \$16,000 the Rockefeller Foundation provides for comprehensive support of PhD students in Africa, to \$10,000 for the USHEPiA program, to \$4,000 in Nigeria, where education is heavily subsidized by the government) and on the assumptions that some nodes would waive tuition and other fees and that some students would participate in sandwich programs with universities outside Africa that would cover costs.

- Support also would be provided for visiting professors, minor equipment and supplies, and some infrastructure, as well as travel, accommodations, and communications. The specifics would vary according to the subject matter, availability of other resources, and contributions and needs of the hub and nodes.

In light of the above, the workshop participants recommended a grant of \$400,000 per network per year for a minimum of five years to ensure that a critical mass of students would emerge fully prepared to enter the academic or technical workforce at the conclusion of the initial five-year grant period. An additional shared pool for instrumentation also was recommended.

Because of the complications involved in launching five or six networks simultaneously, a suggestion was made to sequence the implementation, beginning with two or three disciplinary networks in the first year and adding the rather more complex applied networks one or two years later.

5. Complementarity, Partnerships, and Leverage

STI capacity building stands on three legs: institutions, infrastructure, and people. RISE focuses on the third and is being designed to complement and strengthen initiatives that focus on the other two. These include, among many others, programs of the Partnership for Higher Education in Africa, which strengthen selected universities; Sweden's International Science Program, which supports selected chemistry, physics, and mathematics departments; and the Scandinavian aid organizations, which have done much to enhance computer and other infrastructure in Africa's universities. NEPAD's implementation of the Consolidated Plan of Action program for networks of centers of excellence includes human resource development as just one part of a broader mandate that also encompasses development of institutional and political regulations, obtaining political and civil society support, strengthening the capacity of regional institutions, and integrating R&D into sectoral programs.

The potential for contributions from scientists outside Africa was explored. Several avenues were suggested. First, there was a strong call for Diaspora participation in RISE networks. One way to involve the Diaspora community and other scientists from outside Africa would be through the Global Science Corps (GSC), an initiative under development by SIG, AAS, and TWAS to place scientists and engineers from scientifically advanced countries at universities and research institutes in developing countries for one-year terms to share expertise and collaborate with local partners. Another would be to build on the TWAS Research Professors program, which supports faculty members visiting an institution in a developing country three times over five years. TWAS also runs several programs, funded by the Swedish government, which could add a dimension to RISE. These provide fellowships for African students to study in Brazil, China, India, and Pakistan, and grants to African research groups.

Individual universities have expressed an interest in forming partnerships. The University of Texas-Austin in particular is exploring ways to encourage graduate student and faculty collaborations and would consider playing a coordinating role with other U.S. universities to broaden the impact of its contribution.

World Bank representatives have been actively engaged in discussions over the past half year leading up to the workshop. The World Bank and African Development Bank both are in the early stages of exploring mechanisms to support regional initiatives for science, technology, and innovation in Africa. Their representatives at the workshop were encouraging about the prospects for Bank contributions to a scaled-up initiative if the first, Carnegie-supported phase of RISE is successful – as determined by metrics that the workshop participants only began to consider.

At the same time, TWAS has a grant from Sida/SAREC for \$500,000 per year for four years for basic sciences in S&T lagging countries, primarily in sub-Saharan Africa. Mohamed Hassan said he would take to the officers of TWAS a proposal to provide co-financing from these funds to work with SIG to build up the basic science component of RISE.

6. The Way Forward

A draft proposal will be prepared by SIG and circulated among workshop participants for comments. These will be incorporated into a revised draft. Further consultations will take place as required before a formal proposal is submitted to Carnegie Corporation of New York on or before 31 October 2007. The Carnegie Corporation board will meet on 1 December to review the proposal. Assuming a successful outcome, the initial RISE competition will take place in 2008 and programs will begin in the 2008-09 academic year.

In his closing remarks, Shem Arungu-Olende, Secretary-General of the African Academy of Sciences, extended his gratitude to the secretariats of AAS and SIG, to all the workshop participants, and especially to Carnegie Corporation for its outstanding contribution to the development of science and education in Africa. He added that he hoped the Corporation would consider tripling the amount of funding originally discussed, and he expressed the hope that the World Bank and African Development Bank also would become supporters of RISE.

Participants

Shere Abbott, University of Texas-Austin, USA (shereabbott@austin.utexas.edu)
Berhanu Abegaz, University of Botswana; Network for Analytical and Bio-Assay Services in Africa (NABSA), Botswana (abegazb@mopipi.ub.bw)
Olusegun Adewoye, National Agency for Science and Engineering Infrastructure (NASENI), Nigeria (oadewoye@yahoo.co.uk)
Stephen Agong, African Academy of Sciences (AAS), Kenya (sagong@aasciences.org, sgagong@maseno.ac.ke)
Samuel Akatch, AAS, Kenya (asp@aasciences.org)
K.A. Ako-Nai, Obafemi Awolowu University, Nigeria (kwashajibad@yahoo.com)
Alan Anderson, Science Initiative Group (SIG), USA (alan@ias.edu)
Shem Arungu-Olende, AAS, Kenya (arunguolende@aol.com)
Lamin Barrow, African Development Bank, Kenya (l.barrow@afdb.org)
John Boright, National Academy of Sciences, USA (jboright@nas.edu)
Mike Ehst, World Bank, USA (mehst@worldbank.org)
Peter Ekweozoh, Ministry of Science and Technology, Nigeria (pcekweozoh@yahoo.com)
Terri Givens, University of Texas-Austin, USA (tgivens@mail.utexas.edu)
Phillip Griffiths, SIG; Institute for Advanced Study (IAS), USA (pg@ias.edu)
Francis Gudyanga, Research Council of Zimbabwe; ICSU, Zimbabwe (fpgudyanga@zarnet.ac.zw)
Mohamed Hassan, SIG; AAS; TWAS, Italy (mhassan@twas.org)
Arlen Hastings, SIG, USA (hastings@ias.edu)
Sara Hastings, SIG Intern, USA (sarah@ias.edu, shasting@princeton.edu)
Michael Hughes, Ministry of Education, Science, Technology and Scientific Research, Rwanda (m.hughes@yahoo.com)
Turner Isoun, Ministry of Science and Technology, Nigeria (isoun@aol.com)
Iba Kone, African Forest Research Network (AFORNET), AAS, Kenya (i.kone@afornet.org)
Amadou Hama Maiga, International Institute for Water and Environmental Engineering (2iE), Burkina Faso (amadou.hama.maiga@2ie-edu.org)
Paul Mugambi, Uganda National Academy of Sciences, Uganda (pmugambi@math.mak.ac.ug)
Hital Muraj, Cisco Networking Academy, Kenya (hmuraj@cisco.com)
Burton Mwamila, University of Dar es Salaam; African Institute of Science and Technology (AIST), Tanzania (mwamila@udsm.ac.tz)
Katherine Namuddu, Rockefeller Foundation, Kenya (knamuddu@rockfound.org)
J.P.R. Ochieng'-Odero, ICIPE, Kenya (jprochieng@icipe.org)
Wandera Ogana, University of Nairobi; African Mathematics Millennium Science Initiative (AMMSI), Kenya (wogana@uonbi.ac.ke)
Jacqueline Olang, AAS, Kenya (aas@aasciences.org)
Samuel E. Oreta, Ministry of Science and Technology, Kenya
Sonia Plaza, World Bank, USA (splaza@worldbank.org)
Williams O. Siyanbola, National Centre for Technology Management (NACETEM), Nigeria (wsybola@yahoo.com, dg.ceo@nacetem.org)
Shobhana Sosale, World Bank, Kenya (ssosale@worldbank.org)
John Ssebuwufu, Association of African Universities (AAU), Ghana (pjmsseb@aau.org)
Alex Tindimubona, UN Economic Commission for Africa (UNECA), Ethiopia (atindimubona@uneca.org)
Nelson Torto, University of Botswana; Southern & Eastern Africa Network of Analytical Chemists (SEANAC), Botswana (torton@mopipi.ub.bw)
Alfred Watkins, World Bank, USA (awatkins@worldbank.org)
Aissétou Yayé, Forum for Agricultural Research in Africa, Ghana (ayaye@fara-africa.org)
Yonas Yemshaw, AAS, Kenya (y.yemshaw@afornet.org)
--
Tewabech Bishaw, observer (bishawtewabech@yahoo.com)
Marian Griffiths, observer (taffy@ias.edu)