



DEVELOPING A SCIENCE AND TECHNOLOGY STRATEGIC FRAMEWORK

A synthesis Report of the First Workshop

**Organized by the Secretariat of NEPAD and the
Department of Science and Technology (DST)
of the Republic of South Africa**

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1. INTRODUCTION

Scientific advances and technological change are the main drivers of economic growth and development. The ability of countries and their firms to create, distribute and utilize scientific and technological knowledge is now a major determinant of their competitiveness in the global economy. Countries that possess this ability are also able to use science and technology to improve the quality of life of their people.

There is an explicit correlation between a country's scientific and technological status and its economic performance and affluence, and indeed the gap between poor and rich countries in terms of real income is largely accounted for by differences in the accumulation and utilization of science and technology. Closing this gap will require deliberate measures to build scientific and technological capabilities of the poor countries. The international community is increasingly recognizing this. For example, in September 2000 the United Nations General Assembly adopted the United Nations Millennium Declaration in which world leaders pledged to "halve, by the year 2015, the proportion of the world's people whose income is less than one dollar a day and the proportion of people who suffer from hunger and, by the same date." In particular, they agreed to "take special measures to address the challenges of poverty eradication and sustainable development in Africa, including debt cancellation, improved market access, enhanced Official Development Assistance and increased flows of Foreign Direct Investment, as well as transfers of technology."¹

The World Summit on Sustainable Development (WSSD) held in Johannesburg 2002 gave more political currency to the importance of science and technology as determinants of sustainable development. The Plan of Implementation adopted by governments at the WSSD gives significant attention to the role of science and technology in meeting sustainable development goals. Many of its recommendations are about mobilizing and directing science and technology to solve problems associated with energy deficiency, food insecurity, environmental degradation, diseases, water insecurity and many other sustainable development challenges. The Plan requires the international community to "[p]romote technology development, transfer and diffusion to Africa and further develop technology and knowledge available in African centres of excellence; and [s]upport African countries to develop effective science and technology institutions and research activities capable of developing and adapting to world class technologies".

The role of science and technology in promoting Africa's economic transformation and sustainable development has also been emphasized in a number of recent regional policy instruments and declarations. For example, the Africa, Caribbean and Pacific (ACP) and the European Union Forum on Research for Sustainable Development held in Cape Town 29-30 July 2002, attended by ministers responsible for science and technology, adopted the Cape Town Consensus stressing the importance of science and technology cooperation. It called upon "the ACP States, EU Member States, European Commission and the ACP General Secretariat, to make appropriate and timely

¹United Nations 2000. *United Nations Millennium Declaration*. New York: United Nations.

arrangements for the most effective utilisation of funding instruments in the 6th Framework Programme (FP6) and in the 9th European Development Fund (EDF9), in support of Science and Technology (S&T) Cooperation and research capacity building, respectively.”

Africa’s regional economic integration agreements stress the importance of countries cooperating in fields of science and technology development. For example, Articles 103, 104 and 127 of the Treaty establishing the Common Market for Eastern and Southern Africa (COMESA) are dedicated to issues of cooperation in the development of science and technology. Article 21 of the treaty establishing the Southern Africa Development Community (SADC) aims at promoting cooperation in science and technology. The East African Community (EAC) Treaty devotes its Article 103 to issues of cooperation in science and technology. Similar provisions are found the treaty of the Economic Commission of West African States (ECOWAS) and the Constitution of the African Union (AU).

2. BACKGROUND AND OBJECTIVES OF THE WORKSHOP

The New Partnership for Africa’s Development (NEPAD) is a regional initiative developed and adopted by African leaders and endorsed by the United Nations General Assembly as Africa’s development framework. NEPAD “is a pledge by African leaders, based on a common vision and a firm and shared conviction, that they have a pressing duty to eradicate poverty and to place their countries, both individually and collectively, on a path of sustainable growth and development, and at the same time to participate actively in the world economy and body politic. [It] is anchored on the determination of Africans to extricate themselves and the continent from the malaise of underdevelopment and exclusion in a globalising world.”²

NEPAD explicitly recognizes that the region’s economic recovery and transition to sustainable development will be achieved if science and technology are harnessed and applied to solve pressing food production, disease, energy insecurity, communication and environmental problems. NEPAD calls for the establishment of regional platforms with concrete actions to build and strengthen Africa’s competence to harness and use new technologies for human development. Through NEPAD, Africa also aspires “to increase her contribution to science, culture and technology”.

To explore ways and means of translating these goals into concrete actions, the Secretariat of NEPAD and the Department of Science and Technology (DST) of the Republic of South Africa organized a regional workshop on “Developing a Shared Platform for Science and Technology”. The workshop was held on February 17-19, 2003 in Johannesburg, South Africa and attended by more than 50 representatives of governments, regional and sub-regional economic integration bodies, the European Commission, United Nations agencies, and the scientific community. It was officially

²NEPAD 2001. *The New Partnership for Africa’s Development*, p. 1. The New Partnership for Africa’s Development.

opened by South Africa's Minister for Arts, Culture, Science and Technology Dr. Ben Ngubane and chaired by Prof. A. Babatunde Thomas, Presidential Advisor Human Resource, Science and Technology, Republic of Nigeria.

Its specific objectives were to:

- (a) discuss factors that impinge on national and regional efforts to advance scientific and technological development;
- (b) identify specific issues to be considered in the development of NEPAD's science and technology strategic framework and action plan; and
- (c) identify and agree on modalities of establishing a platform or forum that would develop and promote the implementation of the framework and action plan.

Discussions at the workshop were guided by background papers, presentations on country perspectives (made by Egypt, Nigeria and South Africa), lessons and opportunities for international cooperation (by European Commission, United Nations Educational, Scientific and Cultural Organization (UNESCO), International Development Research Centre (IDRC), Inter-Academy Council, French Ministry of Foreign Affairs and the Royal Institute of International Affairs (RIIA)) and challenges and opportunities for regional science and technology cooperation (the Common Market for Eastern and Southern Africa (COMESA), East African Community (ECA), Economic Community of West African States (ECOWAS) and the Southern Africa Development Community (SADC)).

3. OVERVIEW OF ISSUES³

African countries are faced with multiple challenges of eradicating poverty, sustaining the integrity of the natural environment and responding to the forces of economic globalization. They constitute the poorest region of the world. Their economies have experienced poor and deteriorating performance in the past three decades. For example, in 1970 sub-Saharan Africa's annual growth of real per capita Gross Domestic Product (GDP) was estimated at 3.2 per cent, while South Asia's was 1.2 per cent. By 1989 the trend had been reversed with Africa registering 2.2 per cent and South Asia averaging 3.2 per cent. In 1998 more than 301 million Africans were living on less than US\$ 1 per day compared to 217 million in 1987.⁴ Africa has now the largest share of people living on less than \$1 per day. In contrast, poverty declined most rapidly in South and East Asia during the 1990s.

The workshop recognized that the above development challenges cannot be effectively addressed through NEPAD without investments in science and technology. Science and technology—depending on whether and how they are harness and applied—will play a major role in the economic transformation, improvement of the quality of life

³ This section provides a summary of issues that were discussed and draws from the presentations made at the workshop.

⁴ <http://www.worldbank.org/poverty/data/trends/regional.htm#afri>

and sustainable development of Africa and its people. Indeed science and technology have to underpin the whole NEPAD framework and its programmes. A significant measure of NEPAD's attention will need to be directed to processes and activities that build Africa's scientific and technological status.

There are a number of critical factors that currently constrain or undermine efforts to build Africa's scientific and technological development. *First*, in most countries of the region there are weak links between science enterprises and political institutions. Political organizations in the region have not accorded science and technology much attention in their manifestos and parliamentary activities. Technological change is a complex process that is influenced by many political factors. To engage in and manage this process, countries require the support of high-level political institutions. These institutions often determine the nature and levels of resources that go into public research and development activities and the overall governance of science and innovation. There is, thus, a need to build strong political constituencies for science and technology development in Africa.

Second, most African countries formulated their science and technology policies in the 1970s and 1980s when development imperatives and technological opportunities were difficult. Many of the policies are focused on organizational aspects and not on programmatic issues. Countries have for the last years been preoccupied with the creation of commissions or secretariats to promote science and technology, and have paid little attention to long-term programmatic aspects of science and technology development. These commissions and secretariats have emerged to give administrative outlook to the role of science and technology in national affairs but they have never really built the necessary programmes to anticipate and respond to emerging scientific and technological developments. Some of these institutions have, over time, lost touch with the reality: it takes more than administrative oversight to promote science and technology development.

Third, African countries have devoted considerably low, and in many cases declining, funding to research and development (R&D). Most of them spend less than 0.5 percent of their Gross Domestic Product (GDP) on R&D. This is so despite the declaration in the Lagos Plan of Action and in national science and technology policies that each country would allocate at least 1 percent of its GDP to R&D activities. In such economic areas as agriculture, funding to R&D has declined drastically in the last decade or so to the extent that the region's ability to achieve and sustain food security is being impaired. The low and declining expenditure on R&D is a manifestation of the low priority that countries have given to science and technology.

Fourth, associated with the above three factors, there is declining quality of science and engineering education at all levels of educational systems in Africa. Student enrolment in science and engineering subjects at primary, secondary and tertiary levels is also falling. These developments undermine the continent's aspiration to build up its numbers of scientists, engineers and technicians.

Fifth, Africa is losing some of its best scientific and technical expertise to other regions of the world. The number of African scientists and technicians who are leaving the continent for employment abroad is growing. This—‘brain drain’—is caused by a variety of factors including poor research infrastructure and poor remuneration packages. While other regions e.g. Asia have developed and adopted strategies to mobilize and utilize their diasporas, Africa lacks such measures. The region can no longer afford to ignore this capital—African scientists and technicians abroad. It needs to design ways to tap and use the enormous scientific and technical talents of Africans abroad for its own scientific and technological development.

Sixth, another challenge faced by African countries relates to strengthening and/or building institutions dedicated to scientific and technological innovation. As a result of the above factors, R&D institutions in many countries are getting weaker. Most countries have not organized and mobilized their institutions in such ways as to efficiently mobilize and utilize their scarce financial and human resources in specific fields of scientific and technological development. They tend to spread their resources thinly across the institutional terrain. The region as a whole has not been able to grow ‘centres of excellence’ in such areas as biotechnology, space science and information and communication technologies (ICTs).

Seventh, generally, there are weak links between public R&D institutions and industry. Research results of public R&D activities do not often get accessed and used by local industries, particularly small and medium-scale enterprises (SMEs). In many cases there is mismatch between R&D activities and national industrial development goals and strategies. For example, while industrialization policies of most African countries have put emphasis on building and strengthening SMEs, scientific R&D institutions have weak links to these enterprises.

Lastly, there are a number of other cross-cutting policy issues that impinge on the continent’s scientific and technological development. These include such issues as intellectual property protection, biosafety, the role of women in R&D, the impact of new technologies on women, and ways and means of ensuring that foreign direct investment facilitates transfer of new technologies. These issues need to be addressed by individual countries and collectively through NEPAD.

4. ACTIONS TO BE CONSIDERED IN THE FRAMEWORK OF NEPAD⁵

Addressing the above set of issues and concerns will require a coherent strategic approach. Such an approach should recognize the interrelatedness of the issues. Below are some of the priority issues and actions that were proposed at the workshop for consideration in the formulation of an overall NEPAD science and technology framework and action plan.

1. *Build reliable and adequate information on and knowledge of the African science and technology landscape.* While the above concerns and issues pertain to the region as a whole, it is crucial to note that there are significant differences in the way different countries are handling scientific and technological development. The region is diverse and countries are at different stages of technological development. Some of them are making various institutional and policy reforms. The nature and success of these reforms need to be assessed and experiences shared among and/or between countries. It was recommended that countries should, based on their national priorities and taking into consideration opportunities associated with regional science and technology cooperation, endeavour to review their R&D systems and to share information on the status of science, technology innovation activities, including on the nature and effectiveness of their R&D policies and strategies. A synthesis review of the national S&T systems should be prepared. A database on national S&T systems and regional S&T programmes should be established.
2. *Identify and institute specific measures to increase financial investment in R&D—*Africa is unlikely to attain scientific and technological development and improve its economies and livelihoods of the majority of the population if, individually and collectively, countries do not increase financial allocation to R&D. The workshop recommended that the proposed NEPAD science and technology strategic framework should identify and articulate specific ways and means of leveraging and allocating more financial resources to R&D activities. Emphasis should be placed on how to mobilize national and international public and private funding for national and regional S&T programmes.
3. *Explore ways of addressing the brain drain problem—*There is recognition that African countries need to stop the increasing loss of its scientific expertise to the rest of the world as well as to put in place specific measures that will ensure that Africans in the diaspora contribute to the region's scientific and technological development. The workshop recommended that NEPAD should review previous efforts at addressing these challenges and formulate long-term strategic actions to reduce the 'brain drain'.
4. *Develop and/or establish networks of centres of excellences in specific fields—*To consolidate and effectively utilize human, technical and financial resources to address specific developmental challenges (in particular poverty related ones), African countries should strengthen existing centres and where necessary create

⁵ This section provides a synthesis of actions that the workshop recommended to be considered in the formulation of NEPAD's science and technology strategic framework and action plan.

- new ones at both national and regional levels. Such centres should be networked to achieve intra- and inter-regional institutional synergy, and maximize sharing of resources. NEPAD, in collaboration with regional and international organizations such as the European Commission, IDRC and RIIA, should promote this by (a) developing a conceptual framework for identifying and networking centres of excellence; and (b) supporting countries to map national and regional networks of excellence in scientific research and technological innovation.
5. *Mainstream science, technology and innovation considerations into all NEPAD programmes*—Science, technology and innovation underpin all facets of sustainable development and should thus be treated as cross-cutting elements in NEPAD’s programmes. It is important to ensure that science and technology are mainstreamed in all programmes of NEPAD. This will require reviewing existing programmes and where necessary strengthening their scientific and technical content. NEPAD may wish also to develop a set of guidelines for mainstreaming science and technology into its programmes.
 6. *Promote and/or strengthen regional and international science and technology cooperation*—Regional and international collaboration are important avenues of strengthening Africa’s scientific and technological development. Such regional and sub-regional bodies as ECOWAS, AMU, EAC, COMESA and SADC should play a major role in promoting science and technology cooperation. South-South and South-North forms of cooperation are also crucial. NEPAD should play a major role in promoting these forms of cooperation. It is recommended that NEPAD review the nature of regional and international science and technology cooperation to in order identify and promote ‘best practices’.
 7. *Develop and implement flagship inspirational programmes*—In addition to those activities and processes that are aimed at improving conditions for scientific and technological development, there is a need for NEPAD to encourage countries and facilitate their efforts to develop and implement concrete regional scientific research and innovation programmes in such fields as biotechnology, ICTs and space science. For example, NEPAD may wish to develop regional programmes on the application of modern biotechnology to improve drought resistance abilities of selected crops. It may also wish to promote projects on the application of genomics to develop vaccines. Such programmes would be implemented through or by designated NEPAD centres of excellence.

5. THE WAY FORWARD

The workshop recommended that NEPAD should formulate a strategic and long-term framework and action plan to address the range of issues outlined above. The process of generating such a framework and action plans should be driven by countries and be transparent to involve representatives of all stakeholder groups. In particular, it should draw lessons from prior regional initiatives and must aim at generating a coherent body of programmes that will add new value to ongoing activities. Such a process should be knowledge-based and erected at the highest levels of political governance in Africa.

It was recommended that a NEPAD S&T Forum be established. The Forum would comprise of a high-level committee of ministers and presidential science advisors, a panel of eminent persons/experts, and an electronic platform of all other stakeholders. It would mobilize African scientists, policy-makers, civil society, industrialists and other stakeholders to develop NEPAD's science and technology strategic framework and action plan.

The high-level ministerial and presidential advisors committee of the Forum would:

- (a) critically examine and dialogue on emerging science and technology questions and their implications for Africa's sustainable development;
- (b) provide political guidance to formulate and cause the adoption of an African/NEPAD blueprint on science and technology; and
- (c) recommend to NEPAD Heads of State Committee specific actions to taken to enhance Africa's scientific and technological development.

The panel of eminent experts/persons would provide technical advice to the committee of ministers and presidential advisors. It will be instrumental in building awareness of global scientific and technological developments that are important for fostering Africa's sustainable development. The panel would conduct its work through task forces on specific themes and may commission existing regional and international institutions to prepare background papers on some of the identified issues. Both the ministerial committee and panel would interactively determine priorities and substantive themes to be addressed by NEPAD.

To ensure broad-based participation of all stakeholders, an electronic platform—a series of electronic workshops and conferences—would be established on each of the key issues and questions being addressed by the panel and ministerial committee. Draft elements of the strategic framework and action plan would be posted and subjected to wide review by stakeholders.

Annex: Statement of Commitments

Preamble

Subscribing to the principles of the New Partnership for Africa's Development (NEPAD), we the representatives of founding member states, national and regional economic bodies, and intergovernmental organizations and partners, meeting in Johannesburg, South Africa on February 17-19, 2003 at this first workshop on developing science and technology framework for NEPAD;

Reaffirm the important role that science and technology plays in human development and Africa's economic, social and political transformation;

Stress that the pace of economic globalisation is now largely influenced by, *inter alia*, rapid advances in science and technology and that Africa must ensure benefit from the opportunities offered by globalisation and minimize the risks of marginalisation;

Express our concern over the continued inadequacy of financial and organizational resources for fostering Africa's scientific and technological development, and the recognizing the urgency to build political commitment to increase financial resources both public and private for scientific research and innovation;

Stress the need to establish science and technology as a cross-cutting and multi-sectoral theme within the framework and implementation plans of NEPAD, particularly through effective and better planning, integration and coordination, including regional cooperation in science and technology,

Reaffirm our commitment to implement the provisions of the Plan of Implementation of the World Summit on Sustainable Development (WSSD), and the United Nations Millennium Development Goals;

Recognize the Cape Town Declaration on Research for Sustainable Development adopted at the ministerial meeting of African, Caribbean and Pacific (ACP) Group of States;

Recognize the importance of establishing and strengthening cooperation and partnerships among public and private sectors, civil society and academic institutions in Africa, and enhancing South-South and South-North science and technology cooperation;

Noting with concern that:

1. There is need to build a knowledge and information base on the nature and status of scientific and innovative activities being conducted by national and regional research institutions in Africa.
2. There is need to network and maximize synergy among research institutions within and across national boundaries.
3. The link between scientific institutions and industry is still weak; and in many instances there are gaps between activities of the scientific institutions and overall economic and industrial development aspirations of countries.
4. The potential of science and technology to address issues of poverty continues to be underestimated, and emphasis is still placed on outdated notions of technology transfer in development strategies.
5. The increasing outward mobility and loss of African scientists to the rest of the world requires, inter alia, urgent attention. There is need to establish conducive conditions to retain and effectively utilize African scientific expertise on the continent and in the diaspora.
6. There is a need to stimulate interest in and improve the quality of science education at all levels in many African states.
7. A number of African countries are making significant progress to increase investment in and improve the quality of their science and technology systems. However, many of them have so far not been able to achieve their goal/aspiration to devote at least 1% of their Gross Domestic Product (GDP) to R&D activities.

We hereby acknowledge the need to:

1. Establish processes for strategic review of national policies, strategies and performance on science, mathematics and engineering education with the support of the countries. These processes need to urgently target countries where limited data is available.
2. Establish processes for comprehensive review of Africa's science and technology status, research capacities in key fields relevant to the strategic goals and programmes of NEPAD with the support of individual countries. The reviews should be phased in such a way as to provide the basis for identifying science and technology inputs to NEPAD priority programmes.
3. Consistent and ongoing efforts should be made to mainstream science and technology in NEPAD's sectoral programmes on health, agriculture, education, environment, governance, infrastructure, security, investment, trade and others.
4. Strengthen and where necessary create centres and networks of excellence in support of the broad objective of science and technology institution building and human resource development critical to the achievement of Africa's interests in the global context.
5. Where appropriate, we will developed and adopt concrete regional scientific research and innovation programmes on, for example, biotechnology, indigenous

- knowledge, desertification, information and communication technologies and space science, among others, to address the challenges of poverty reduction as well as other problems and opportunities agreed upon within the NEPAD framework.
6. Develop a data resource and supporting systems leading to dynamic and responsive sets of indicators for setting strategies, monitoring performance and assessing impacts.
 7. NEPAD should establish an open forum to engage all stakeholders in constructive dialogue on ways and means of strengthening Africa's scientific and technological base.
 8. Establish knowledge-based processes to develop a science agenda that will bring about rapid technological development of the continent, for example enhancing industrial production by targeting small and medium enterprises (SMEs).
 9. Ensure that sustained attention is directed to capacity development of science and technology systems, institutions and practitioners.

Accordingly, **we recommend** that appropriate organs of NEPAD and where necessary other competent and interested entities commit themselves to:

- (a) Establish, in response to the November 2002 Abuja Declaration of ministers and senior policy-makers, a High-level Forum on Science and Technology. The Forum should be composed of African ministers of science and technology, and/or presidential science advisors. It should be supported by senior policy-makers and will engage in dialogue and decision-making on effective means of building the continent's scientific and technological development. The High-level Forum on Science and Technology should where required transmit its resolutions to the NEPAD Heads of State Implementation Committee.
 - (b) Establish a panel or working group of eminent African experts—drawn from communities of scientists, industry, policy-makers and practitioners—to provide policy, strategic and technical advice to the High-level Forum. The panel or working group should propose a NEPAD science and technology programmatic framework. In conducting its work, it should draw on the existing national, regional and international resources. African countries should be enabled to participate in particular initiatives at their discretion.
 - (c) Set up an electronic platform, meetings and workshops as appropriate to facilitate dialogue and engage all stakeholders to develop a common vision, agenda and action plan to promote and sustain Africa's scientific and technological development.
 - (d) Provide technical, administrative and financial support to the enable the operations of the above recommended structures.
 - (e) Commit to a firm timetable and timely action to realize the above recommendations.
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