



SWEDISH INTERNATIONAL DEVELOPMENT COOPERATION AGENCY

**REPORT OF THE FIRST TRAINING
WORKSHOP ON AFRICAN SCIENCE,
TECHNOLOGY AND INNOVATION
INDICATORS AND SURVEYS**

**10-14 March 2008
Centurion Lake Hotel
Centurion
Gauteng, South Africa**

CONTENTS

<i>Acknowledgements</i>	2
<i>Acronyms and Abbreviations</i>	3
Introduction.....	4
Attendance	5
Opening Session.....	5
Key note addresses	7
National Systems of Innovation in Africa.....	9
Countries and partners experiences.....	12
R&D indicators and surveys	13
Innovation indicators and surveys.....	15
Statistical considerations for R&D and innovation surveys and indicators	17
Ethical challenges.....	18
Implementing national R&D and innovations surveys.....	18
Observatory of science, technology and Innovation.....	17
Recommendations and way forward....	20
Official closure	22
Annex I Workshop Programme	
Annex II List of participants	
Annex III Presentations	

ACKNOWLEDGEMENTS

The training workshop organizing team would like to acknowledge the contributions of many committed organizations and resources persons. These include: the African Development Bank; the Centre for Science, Technology and Innovation Indicators (CeSTII) of the Human Sciences Research Council of South Africa; the Department of Science and Technology of the Republic of South Africa; the Directorate of Human Resources, Science and Technology (HRST) of the AU Commission; the International Development Research Center (IDRC); the Members of the Faculty; the Participating Ministries and the NEPAD Office of Science and Technology; the Research Policy Institute of the Lund University, Sweden; the Swedish International Development Cooperation Agency (Sida); and the UNESCO Institute of Statistics.

ACRONYMS AND ABBREVIATIONS

AfDB	African Development Bank
AU	African Union Commission
AMCOST	African Ministerial Conference on Science and Technology
ASTII	African science, technology and innovation indicators initiative
CeSTII	Centre for Science, Technology and Innovation Indicators
COSTECH	Tanzania Commission for Science and Technology
CPA	Consolidated Plan of Action
GDP	Gross Domestic Product
IDRC	International Development Research Center
HRST	Human Resources, Science and Technology
NEPAD	New Partnership for Africa's Development
NESTI	National Experts on Science and Technology Indicators
OECD	Organisation for Economic Co-operations and Development
OST	Office of Science and Technology
R&D	Research and Development
SAREC	Swedish Agency for Research Cooperation
SIDA	Swedish International Development Cooperation Agency
STI	Science, Technology and Innovation
UNESCO	United Nations Educational, Scientific and Cultural Organization
UN	United Nations
UNECA	United Nations Economic Commission for Africa
UNCTAD	United Nations Conference on Trade and Development
UNIDO	United Nations Industrial Development Organisation
URL	Uniform Resource Locator

INTRODUCTION

1. The first training workshop on African science, technology and innovation indicators and surveys took place from 10 to 14 March, 2008, at Centurion Lake Hotel in Centurion, South Africa. The Workshop was jointly organized by the New Partnership for Africa's Development (NEPAD) Office of Science and Technology (OST) and the Research Policy Institute of Lund University, Sweden.
2. This training workshop was one activity of the ASTII work plan as agreed by the Inter-Governmental Committee on ASTI Initiative Meeting held in Maputo in September 2007.
3. The main objectives of the workshop were:
 - To create a platform for participants to share experiences and knowledge necessary to conduct Research and Development (R&D) and/or Innovation surveys and to develop relevant STI indicators;
 - To ensure that participants develop a common understanding of the STI underlying concepts, definitions, issues and approaches, and harmonize survey instruments to conduct such surveys;
 - To promote collaboration and partnership between STI stakeholders.
4. It would be recalled that the Inter-Governmental Committee on the ASTII Meeting held in Maputo in September 2007, recommended that the countries may choose to conduct either R&D or innovation survey or both. However, combining both surveys into one requires skills and expertise which may present challenges that are not easy to overcome in a pilot phase. To that end, it was envisaged that countries will embark in the collection of R&D data on one side and/or Innovation data on the other. Direct measures of the output of scientific and technological activities such as bibliometric and patents indicators will be the responsibility of the NEPAD OST. It was noted that the two surveys are not mutually exclusive.
5. The training programme (**Annex-I**) was designed in such a way that participants were introduced to the STI concepts and definitions followed with a series of demonstrations and applications on real case studies. Thereafter, participants practiced the thus learned concepts in breakaway sessions. The workshop spanned over five days and comprised of 20 interactive sessions.

ATTENDANCE

6. Participants in the training workshop were senior government officials from the countries that have expressed interest to participate in the STI pilot phase. These officials will lead the R&D and /or Innovation surveys processes in their respective countries. The following countries participated in the workshop: Algeria, Angola, Burkina Faso, Cameroon, Egypt, Ethiopia, Gabon, Ghana, Kenya, Lesotho, Malawi, Mali, Mozambique, Nigeria, Senegal, South Africa, Tanzania, Uganda, and Zambia. Three officials from the African Union Commission, Department of Human Resources, Science and Technology (AUC-HRST) participated in the workshop.
7. The workshop sessions were facilitated by members of the Faculty comprised of renowned personalities from academia and international organizations with knowledge and practical experience in the STI fields. They came from: African Development Bank, UNESCO Institute of Statistics, NESTI- OECD, South African Human Sciences Research Council, University of Lund, and African Regional Centre for Technology, Tanzania Commission for Science and Technology (COSTECH), UN-HABITAT, University of the Witwatersrand and NEPAD.
8. The workshop was attended by sixty nine participants. The list of participants is attached to this report as **Annex-II** and the lecture notes as **Annex-III**.

OPENING SESSION

Welcoming Address by Professor John Mugabe, NEPAD Advisor and Head of the NEPAD OST

9. In his welcoming address, Professor Mugabe acknowledged the support of several organizations in the implementation of the NEPAD programmes. He especially thanked the Government of the Republic of South Africa through the Minister of Science and Technology (S&T) for its continued support in the implementation of the Consolidated Plan of Action (CPA), the Government of Sweden through the Swedish International Development Corporation Agency and the University of Lund for their financial and technical support respectively. He also thanked, the OECD NESTI which has been involved through Dr Gault in the Working Group that put the ASTII initiative in motion and also facilitated NEPAD OST to gain observer status in OECD NESTI.
10. He thanked all the members of the Faculty and their institutions for their commitment and technical support. He commended the participating countries for embarking in the process of understanding their STI systems and in building capacity to develop science, technology and innovation policies for socio-economic development.

11. He expressed his gratitude to the African Union Commission through its department of HRST. He informed the meeting that the outcomes of the STI surveys will inform the AU Commission's mandate in its STI policy formulation and development.

Opening Remarks by Ambassador Stephen Willoughby, Acting CEO, NEPAD Secretariat.

12. In his opening remarks, Ambassador Willoughby outlined the reasons for African countries to know the status of their STI systems. Such knowledge, he said, will help countries compete in the knowledge based economy. Elaborating on the African leadership and ownership principles that underpin the NEPAD objectives, he urged participants to make use of the STI expertise available at the workshop and be acquainted with enough knowledge and skills to serve as STI ambassadors in their respective countries. As a way forward he said:” *As the hope of the African people is turned towards the future, we shall not allow ourselves to settle with the never ending debate on past failed continental initiatives, but we will however learn from them. A new phase is opening for Africa. Tomorrow will be what we will have done today* “. He thanked all the stakeholders for their continued support to the NEPAD processes and wished delegates a successful workshop.

Opening Remarks by the Representative of the Embassy of Sweden

13. On behalf of the Ambassador of Sweden in South Africa, the first Secretary, Mr Jon Eklund, thanked the NEPAD OST for convening this training workshop and for inviting the Embassy of Sweden to participate in the proceedings. Mr Eklund called on Mrs Ros-Mari, Senior Research Adviser in the Department for Research Cooperation, Sida/SAREC, to address the delegates.
14. In her address, Mrs Ros-Mari recalled the genesis of the CPA, especially the AMCOST meeting of November 2003 that provided the political platform and paved the way for the development of an African system of research and technological innovation. She felt honoured to witness a concrete implementation of one of the CPA flagship projects, namely the ASTII. She said that her country had been involved in supporting capacity building in Africa over the last decades and she reiterated the Swedish willingness to continue assisting NEPAD. She encouraged countries to reflect STI systems in their national accounts for development She acknowledged that Africa abounds in human capital which needs to be tapped into in order to achieve the socio-economic development of the continent. She said “*the fact that this workshop has gathered representatives from the ministries of science, technology and innovation from different African countries as well as other related bodies is a good start for Africa to collaborate on STI matters*”.
15. She commended AMCOST, AU Commission and NEPAD OST, for their efforts in bringing the CPA projects to bear albeit several challenges. She wished delegates a successful workshop.

Opening Remarks by Dr. Mohamed Khalil Timamy on behalf of the Director of AU Commission, Department of Human Resources, Science and Technology (HRST)

16. Dr Timamy, the Coordinator of Science and Technology, Lagos Office of AU Commission HRST Department, welcomed delegates on behalf of the Director AUC-HRST. He informed delegates that his department and the NEPAD OST are in the process of harmonizing their efforts for an efficient implementation of the CPA in general and ASTII in particular. He said that while NEPAD OST guarantees the technical leadership of the CPA, his department will ensure its political support. The two offices will join hands to ensure that the end product contributes towards the well being of the African people. He thanked the participants and all stakeholders for their continued support to the AU/NEPAD CPA and wished delegates a successful workshop.

KEY NOTES ADDRESSES

Keynote Address 1: R&D and Innovation Indicators: “Opportunities for Africa” by Dr Fred Gault

17. From the onset, Dr Gault outlined two main challenges of developing and using the STI indicators: (i) the necessity to provide the Minister of S&T with indicators and policy advice comparable to that received by the Minister of Finance and (ii) making the STI indicators accessible to the policy community and to the civil society for the purpose of policy debate. Using lessons learned in the OECD context, he affirmed that these challenges are attainable. Dr Gault elaborated on the importance of a strong secretariat to support the work of the national STI experts while keeping strong links with the wider international community.
18. Recalling the decisions of the first meeting of the Inter-Governmental Committee on ASTII held in Maputo in September 2007 to use the Frascati & Oslo Family of Manuals, Dr Gault called attention to the importance of encoding knowledge in living manuals. He said that since knowledge is dynamic, manuals that encode such knowledge should be updated accordingly. He recommended space for “time to grow to maturity” and the usage of robust experiences from other regions including the OECD and Latin America.
19. Taking a systems approach, Dr Gault showed that indicators are going beyond measures of activities, such as research and development and innovation, to include work on indicators of linkages, of short-term outputs, and of longer term impacts of the activities and the linkages. He said that indicators can be used to gain an understanding of the dynamic changes that are taking place in the global economy and enable countries to adjust their STI systems to meet the socio-economic targets. He emphasized the importance for Africa to have indicators that tell African stories

and to keep to a common language and common tools in the development of the STI indicators.

Keynote Address 2: “Science, Technology and Innovation Policy Making in Africa: Institutions and Practices” by Professor John Mugabe

20. Professor Mugabe argued for a better governance structure for science and innovation policy formulation in Africa. He said that the current science and innovation policy landscape in Africa is characterized by isolated events rather than processes. He observed that such events do take place in different ministries but unfortunately fail to create a locus of S&T policy processes. He noted the lack of budget preparations for the S&T policy research and the quasi-nonexistence of the STI related research in African universities.
21. Prof. Mugabe outlined several challenges faced by African countries in order for the STI policy systems to play a significant role in the socio-economic development of the continent. These challenges included: the demand for public and private sector participation in the S&T policy formulation, the impact of globalization and the multidimensional nature of S&T policy. He further argued that the S&T policy formulation ought to be inclusive. He invited participants to make use of the experience of the members of the Faculty for a better understanding of the role of the S&T indicators in strengthening S&T related institutions.

Official Opening by Hon. Mr. Mosibudi Mangena, Minister of Science and Technology, Department of Science and Technology, Republic of South Africa

22. In his remarks, Minister Mangena qualified the training workshop as the first tangible ASTI product that has moved the initiative from intentions to action. He recalled the constant calls from AMCOST for the production of internationally comparable STI indicators in monitoring Africa’s scientific and technological development. He acknowledged, however, the challenging tasks to produce such indicators, but said that there were no shortcuts in producing them. He emphasized the importance of producing reliable STI indicators. He said: *“The development of such indicators is not just an academic exercise; these indicators are an important element of the path we are plotting toward economic growth and the well-being of our people. They should lay the foundation for dialogue between policy makers and the producers of knowledge. It is therefore important to produce a set of relevant, accurate, timely, complete and reliable indicators”*. He looked forward to using the African Innovation Outlook as promised by the ASTII.
23. The Minister shared the South African experience in conducting the R&D and innovation surveys and the production of related indicators. While such undertaking is South African specific, he welcomed those countries willing to learn from the South African pitfalls and success stories.

24. The Minister informed the meeting that South Africa has decided to follow the OECD guidelines. He is satisfied with the results obtained so far. He has been able to tell his ministry's story to the public and especially to the minister of finance in a quest for more resources. However, he still needs a better understanding of other areas such as: new technologies including biotechnology and nanotechnology, indigenous knowledge, informal market and the like. He encouraged partnerships with private sectors and civil society organisations for building the national economies. He welcomed the development and implementation of the African observatory concept to ensure foresight and capacity building.
25. He acknowledged the presence of the members of the Faculty, diplomats and country representatives. He wished all the delegates a successful workshop and declared the training workshop officially opened.

NATIONAL SYSTEMS OF INNOVATION IN AFRICA

Members of the Faculty presented the topics outlined below related to the development of National Systems of Innovation (NSI) in Africa. Participants learned various dimensions of R&D and Innovation indicators and surveys. The full presentations are attached as **Annex-3**.

26. ***“Innovation Systems in Africa: Features and Issues”*** by Professor Banji Oyelaran-Oyeyinka, Director (Monitoring and Research Division) UN-HABITAT, Visiting Professor at the Open University, UK. During this session participants were introduced to: the power & danger of ideas that shaped research and policy making and the mindset of policy makers in Africa; innovation in a developing context; Schumpeter's definition of innovation; focus and elements of innovation policy; Features of innovation systems with emphasis on the African innovation system; Domains of systems of innovation; challenges of measurement of innovation; challenges on deciding the survey types; R&D and non R&D activities as per Frascati manual.
27. ***“National Systems of Innovation: Some Important Theoretical Considerations and Critical Issues for Africa”*** by Bitrina Diyamett, Senior Research Officer, Tanzania Commission for S&T (COSTECH) and Coordinator, ATPS-Tanzania. During this session, participants learnt about conceptual innovation issues as they relate to technology; relationship between science and technology; product, process and organizational innovations; factors facilitating innovation and innovation system; and System of innovation in an African Context.
28. ***“Policy, Indigenous Knowledge and Lessons Learned”*** by Dr Ousmane Kane, Executive Director at African Regional Centre for Technology (ARCT) and Fellow of National Academy of Sciences and Techniques of Senegal. During this session, participants were acquainted with the following: Incidence of the knowledge economy; global strategic approach of sustainable development; general

considerations and specific challenges for technological higher education and research in Africa; the ingredient in the formulation of the STI strategy and the domains of research in indigenous knowledge.

29. The above presentations prompted discussions around the locus of the innovation policies and a quest for a better understanding of the concept of national system of innovation, its relation to R&D and the lack of coordination and networking among African actors. In addition, delegates pointed to a fourth layer, namely engineering, to be appended to the STI policy formulation. In response to the above, participants were encouraged to focus on country determination to embark on STI policy and promote coordination and networking for line ministries and councils in charge of STI instead of focusing on the physical location of the STI policy formulation.
30. In order to understand the national innovation systems and their impact on the socio-economic development, Faculty pointed to several models as they evolved over time: the pull versus push models and systems approach. Delegates learnt the components of the NSI, the role of linkages, interaction amongst actors in a dynamic perspective as well as the capacity to harmonize the concepts of science, technology, innovation and engineering. All these concepts are fruit for thought as they underline the whole workshop. Delegates were encouraged to pay attention to the concepts and practical examples as they will be developed during the workshop. Delegates were encouraged to challenge the applicability of certain concepts in the African context.
31. ***“The Use of STI Indicators in Policy Research and Analysis”*** by Professor Claes Brundenius (Research Policy Institute, Lund University, Sweden). During this session, participants learnt about the genesis of the STI indicators and the growing interest in the STI policies. Prof Brundenius used amongst others, the total factor productivity (TFP) and the growth accounting models to illustrate the concepts. He elaborated on the applications of STI indicators with examples from the OECD Science Technology and Scoreboard (latest 2007) and the European Innovation Scoreboard (latest 2008); the use of available indicators in Africa; various applications and interpretation of the Knowledge Index (KI) and the Knowledge Economy Index (KEI). He used spider charts to illustrate several concepts.
32. ***“R&D and Innovation Indicators in Developing Countries”*** by Ernesto Fernández Polcuch (UNESCO Institute for Statistics (UIS)). During this session, participants learnt about the governance of the UIS as it relates to official S&T data source, its strategy on S&T statistics and line of actions. Mr Ernesto discussed the results of the UNESCO 2004 and 2006 Survey of S&T and overviewed the African S&T statistics. He noted that there has been an improvement in response rate from 35% (in 2004) to 61 % (in 2006), he noted that the outcomes of this workshop could contribute to improve the response rate.
33. ***“Towards a statistical Framework for Developing and Measuring Science, Technology and Innovation (STI) Indicators in Africa: The African Development Bank Experience”*** by Koffi Marc Kouakou (African Development Bank, Tunisia).

During this session, participants learnt about the importance of science, technology and innovation for Africa's development. Mr Kouakou elaborated on the work undertaken by the African Development Bank to build capacity in national statistical systems; how to use a "systemic" approach to understand STI concepts. He considered several issues related to data quality to ensure reliable STI indicators. He emphasized the importance of an inclusive process that should lead to conducting STI surveys and developing related indicators.

34. From the previous presentations, delegates noted the lack of STI data on the continent. They noted the existence of the UNESCO questionnaire to collect S&T data but expressed concern with its timing and the lack of dedicated resources. Questions arose as to how one measures innovation in practice, the life cycle of STI surveys and the significance of variables such as GDP in explaining knowledge creation as well as the source of data to construct indices. In response to the above, delegates learned that the purpose of the workshop was to share experiences in conducting STI surveys and promote collaboration among experts. UNESCO welcomed this training workshop as it will improve, through appropriate partnership and collaboration, the quality of STI data on the continent. It was noted that the workshop programme contains sessions specifically designed to demonstrate R&D and innovation in practice. Delegates learned that primary and secondary data, from reliable sources, are necessary to build econometric models. The latter establishes the significance between variables. At present, GDP is one of the proxies used in econometric modeling.

COUNTRIES AND PARTNERS EXPERIENCES IN R&D AND INNOVATION INDICATORS

35. This section outlines the statements that reflected the national S&T and Innovation activities in participating countries. Delegates used these two informal sessions to share experience and learn from each other. It was a platform for the Faculty to be acquainted with the STI status quo in the participating countries. All the Country statements are compiled in Annex 3. The following countries and partners shared their experiences:

- i. The representative from Egypt presented the Egyptian vision for a knowledge economy which is underpinned by three pillars namely: sustainable development of education, research and innovation. He elaborated on the challenges faced by Egypt and a plan of action to overcome them. He also presented a model of a partnership.
- ii. The representative from Kenya presented the Kenya n status of STI initiatives which included: STI medium term plan, STI policy and strategy, the proposed national innovation system, the establishment of endowment fund for research; re-engineering of technical, industrial, vocational and entrepreneurial training and the ongoing database of R&D activities in Kenya.
- iii. The representative from Lesotho presented the STI policy formulation process and informed delegates about the ongoing partnership with international bodies such support by UNECA, UNIDO, UNCTAD and ATPS
- iv. The representative from Uganda elaborated on the Ugandan vision for the STI which read “to build an efficient and effective National S&T statistical system that enables the Council to be the centre of excellence in the management and integration of science and technology into the national development process Status of Science, Technology & Innovation Indicators”. She highlighted the status of the STI indicators and related challenges.
- v. The representative from Nigeria outlined the ongoing work on the development of the STI indicators in Nigeria. In addition to the work plan and budget estimate, he elaborated on Nigeria’s identified Key data sources and the targeted key indicators for policy needs. He pointed out to several experience and capability limitations regarding the development of the STI indicators which ought to be addressed.
- vi. The representative from Senegal outlined the state of Science & Technology in Senegal. He emphasized the need for capacity building in S&T indicators such as: R&D expenditures, R&D personnel, scientific publications and patents. He discussed the importance of an Observatory of STI in Senegal and

the necessity to build a Network within Africa to promote cooperation in SIT related matters.

- vii. The African Union Commission presented the Commission's strategy to develop an African science and technology policy framework.

R&D INDICATORS AND SURVEYS

R&D Indicators: Concept, Definitions, Issues and Approaches

36. In a two hour interactive lecture, participants were introduced to and discussed several dimensions of knowledge and the *raison d'être* of measuring Research and Development (R&D). While introducing participants to the basic definitions and convention of R&D, Dr Gault pointed to the relevant paragraphs in the Frascati Manual. In the same manner, the lecture covered extensively the following areas: institutional classification; functional distribution; measurement of R&D personnel; measurement of expenditures devoted to R&D; survey methodology and procedures; government budget appropriations or outlays for R&D by SEOs (GBAORD). Participants were also acquainted with the ongoing challenges of measuring the relationship between knowledge creation and economic impact. While concluding this module, it noted that measuring R&D would be a mix of Frascati Manual's definitions, of local factors and measurement practices. The great importance should, however, be put on the spirit of the Frascati Manual rather than an uninformed application of the text.
37. Discussions on the above focused on mapping R&D and Innovation on one side and S&T on the other. As a way forward, delegates noted that such a mapping is an open debate in industry and academia. One would, however, abstain to equate R&D to S&T; it was noted that while R&D indicators call for surveys, certain S&T activities do not. In the context of basic research, it was pointed out that publications would not necessarily be an innovation unless it is linked to the market. It was observed that applied research should be defined as acquiring new knowledge rather than generating new knowledge as it is currently expressed in the Frascati Manual. Delegates learned that the Frascati Manual is the main reference for conducting R&D surveys; however, Africa should progressively put its own STI manuals to ease interpretation and applications.

R&D Indicators: Data collection, analysis and reporting

38. On the onset, Prof Khan highlighted the importance of understanding the main drivers of the local economy, the market and political systems before embarking in the collection, analysis and reporting of the data to support the concepts and approaches as discussed in the R&D literature.
39. Participants learned several approaches for data collection including questionnaire design and frequency of surveys. They were introduced to various variables or indicators as defined in Frascati manual. Having conducted several R&D surveys, Prof Khan advised on several pitfalls including the interpretation of the definitions, access and confidentiality issues as well as the accuracy of the data. He further discussed the composition of the survey and analysis teams and the channels of reporting. He pointed out the importance of collaboration on the R&D related activities with international bodies such as UNESCO and the OECD and the necessity to institutionalize R&D surveys and S&T statistics. Professor Khan used the structure of the South African R&D survey questionnaire to demonstrate the R&D theoretical concepts and definitions.
40. **Discussion on session.** Amongst the participants, less than a quarter has ever being involved in the R&D surveys. During discussions, delegates sought primarily clarity on the process of conducting R&D surveys. They learnt that the best way to understand the R&D surveys and challenges is to do it. Being engaged in R&D survey is the best self “teaching kit”. The meeting noted that there are enough survey instruments available in the public domain (i.e. R&D questionnaire) that one may use by adapting them to the local context. It was emphasized that respondents should be handled with care and survey instruments should not be a burden to them. It was noted that conducting both R&D and innovation surveys is a labour intensive undertaking and it should be handled properly to ensure a good response rate. It was also noted that R&D data does not extrapolate as does innovation ones.

R&D surveys in practice

41. Participants used the breakaway sessions to practice on several scenarios of R&D surveys and indicators. They practiced on the following scenarios: (i) calculation of R&D Personnel by level of qualification and function, gender (HC &FTE) and (ii) GERD by source and performance sector. Participants discussed in breakaway groups and presented the summary in the plenary. Interactive sessions on R&D surveys in practice were facilitated by Mr Ernesto Fernández Polcuch from the UNESCO Institute for Statistics.

Core R&D Indicators

42. Delegates debated on the differences between S&T and R&D indicators. They agreed to follow the OECD guidelines and to focus on few core indicators for comparability purpose. However countries would be free to add additional indicators for particular policy needs. For practical purposes, countries were advised not to reinvent the wheel, but to borrow from what have been tested on the ground such as the South African experience. It was advised, however, to keep it simple. The following indicators were chosen as core:

- a) *Gross Domestic Expenditure on Research and Experimental Development (GERD), by source and performance sector*
 - Higher education
 - Government
 - Business
 - Non-Profit organizations
 - Abroad
- b) *R&D Personnel by level of qualification and function, gender(headcount (HC) & full-time equivalent (FTE))*
 - Higher education
 - Government
 - Business
 - Non-Profit organizations
- c) *Researchers by gender and field of study/research*
- d) *Expenditures in development areas identified by the AU/NEPAD Consolidated Plan (to be expanded by NEPAD)*
- e) *Outputs: publications, patents (not core but to be collected).*

INNOVATION INDICATORS AND SURVEYS

Innovation indicators-concept, definitions, issues and approaches

43. As in the case of the session on R&D indicators, participants were introduced to and discussed several dimensions of innovation and how their indicators have evolved over the last decades. While introducing participants to the basic definitions and convention of Innovation, Dr Gault pointed out to the relevant paragraphs in the Oslo Manual which is the main basic reference for conduction Innovation surveys. A particular point of interest for Africa was drawn to Annex A to the Oslo Manual: “Innovation Surveys in Developing Countries”. The lecture covered extensively the following areas: Innovation theory and measurement needs, basic definitions, institutional classifications, linkages in the innovation processes, measuring innovation activities, objectives, obstacles and outcomes of innovation, survey procedures. While concluding this session, it occurred that

measuring the activity of innovation, its linkages and outcomes, is a challenging endeavor and takes time to achieve. The same applies to producing comparable results from innovation surveys. It was advised to start with some few simple measures. Clearly, Innovation surveys are more difficult than R&D.

44. Discussions focused on several challenges including of the incorporating of indigenous knowledge and informal economy in R&D and innovation surveys. It was evidently clear that there is a need for trained staff to conduct such surveys. While innovation makes reference to a short period of time, two/three years, indigenous knowledge would span several generations, therefore the meeting recommended that a separate workshop be held to discuss the salient issues of indigenous knowledge and informal economy. The meeting further recommended that Africa needs to enhance its participation into the global economy, especially in matters of intellectual property; the latter will protect its knowledge systems for the benefit of its citizens. Delegates learnt that the AU commission has initiated a process that will lead to the formation of a Pan African Intellectual Property Organization.

Innovation indicators - data collection, analysis and reporting

45. Professor Kahn discussed the market competitiveness in terms of innovation and knowledge development. Being at the helm of the innovation surveys in South Africa, Professor Kahn introduced participants to various aspects of innovation surveys and indicators. With reference to the Oslo manual and the European Community Innovation Survey, he elaborated on methodological issues, including questionnaire design and frequency of surveys, the importance of survey outcome for to the end users and some problems related to sample construction, access and confidentiality issues as well as the accuracy of the data. As in the case of R&D surveys, participants learnt on the importance of collaboration with international bodies such as Eurostat and the OECD as well as the institutionalization of innovation surveys processes. Professor Khan used the structure of the South African Innovation survey questionnaire to demonstrate the Innovation theoretical concepts and definitions.
46. Professor Khan's presentation prompted several questions on the way that innovation surveys are conducted in practice. Many questions related to statistical considerations were referred to the appropriate sessions; these included: sample size and design, weighting methodology, quality control, etc. Delegates learned that the South African innovation survey was aligned to the CIS and did not include the agriculture services. They learnt that in order to classify enterprises and /or firms engaged in multiple activities, one may look at the activities that generate more revenues. Delegates learned that the period under consideration for innovation may be less than the usual three years depending on the needs. It was further emphasized to keep the innovation survey simple as it is more difficult than the R&D.

Innovation surveys in practice

47. These two combined sessions served as practical examples of innovation surveys and indicators in practice. Participants were given some scenarios including: (i) mapping the national system of innovation and (ii) understanding CIS questionnaire. The summaries were discussed in breakaway groups and the results were presented in the plenary. These interactive sessions were jointly facilitated by both Ms. Bitrina Diyamett (Tanzania Commission for Science and Technology, Tanzania) and Ms. Astrid Szogs (University of Lund).

Core Innovation indicators

48. Delegates discussed the nature of innovation indicators and the conduct of innovation surveys. It surfaced that propensity to innovate and novelty are key core indicators. Comparing various survey instruments, as in the case of R&D, countries agreed not to reinvent the wheel but to borrow from what have been tested on the ground such as the Community Innovation Survey questionnaire, the Canadian Survey of Innovation questionnaire and the South African Innovation survey. For practical purposes, the latter could easily be adapted to the African context.

49. Delegates agreed to include the following heading in the Innovation questionnaire. These heading appear in the South African Innovation survey as follows:

- General information about the enterprise, business, company or firm
- Product (goods or services) innovation
- Process innovation
- Ongoing or abandoned innovation activities
- Innovation activities and expenditures
- Sources of information and co-operation for innovation activities
- Effects of innovation during the last two years
- Factors hampering innovation activities
- Intellectual Property Rights
- Organization and marketing innovations

STATISTICAL CONSIDERATIONS FOR R&D AND INNOVATION SURVEYS AND INDICATORS

50. Mr Marc Kouakou discussed the concept of statistical units and representative sample. He highlighted the importance of a detailed work plan, a budget and adapting the training materials to meet the local needs. He encouraged participants to work with NEPAD in ensuring that survey and analysis teams are properly trained. He further discussed the sampling methodologies and surveys instruments.

51. As a process toward improving the quality of statistics, Mr Sieraag De Klerk discussed the South African Statistical Quality Assessment Framework. The discussion included amongst others: the need for a quality framework, the South African quality assessment framework, purpose of framework, structure of framework and the quality Dimensions.
52. Ms Marlize Pretorius discussed the survey methodology of the South African innovation survey of 2004. Participants learnt about various phases undertaken by Statistics SA to produce the samples requested by the R&D and innovation survey officials. Discussions included: governance issues, issues of relevance for a business registrar, the creation a survey frame, sampling methodology especially random and stratification sampling.

ETHICAL CHALLENGES

53. Professor Ames discussed two fundamental objectives of ethics, namely: How one ought to act in a given ethics situation and what are the reasons for doing so? She argued on the importance of morality to safeguard human dignity and to promote justice, equality, truth, and trust. Based on these premises, she elaborated on research ethics, its principles and challenges with particular applications to data handling. She further argued that demands and goals of research should be pursued with full protections of the rights and dignity of the research participant. Drawing on international examples in general and South African ones in particular, Professor Ames discussed how the increasing knowledge and understanding of research issues have developed over time.

IMPLEMENTING NATIONAL R&D AND INNOVATIONS SURVEYS

54. Prof. Brundenius and Dr Mawoko facilitated discussions on the role of the Focal Point, the next steps in the implementation of the ASTII and the structure for the budget to conduct the in-country surveys.
55. As spelt out in the decisions of the meeting of the Inter-Governmental Committee on ASTI held in Maputo in September 2007, the importance of a focal point was re-emphasized. Countries that had not designated one were urged to do so and to provide formal contact details to ensure liaison and coordination. .
56. Delegates discussed the forthcoming activities in the short, medium and long terms. They agreed to continue digesting the contents of the training with the national teams and to convene a meeting in the three months time frame (by June/July 2008) to compare and harmonize the work done on sampling and pre-testing of the questionnaires. The launch of the surveys was estimated around July/August 2008 time frame.

57. Participants agreed to send the NEPAD OST their estimates for the in-country budget by the end of March. The meeting noted the variations in the budgeting cycles amongst the participating countries. To this end, country should be treated on one-by-one basis.

OBSERVATORY OF SCIENCE AND TECHNOLOGY

58. Professor Khan noted the importance for South Africa to establish a national Observatory of Science, Technology and Innovation (OSTI). He said that African countries, like most of the developing countries, have, over the years, provided socio-economic data to international organizations. Africa, however, does not have a history of measuring and managing science and technology information. Professor Khan argued that unless STI information is properly managed, this sector will not contribute toward the economic growth and well-being on the continent.
59. He introduced the concept of OSTI as a vehicle to manage information on science, technology and innovation to strengthen evidence-based policy. With reference to the ongoing work on establishing a South African OSTI and several examples around the world, Professor Khan exemplified several possible structures, partnership models and governance issues that could be used if African countries embark on establishing national or regional OSTI.
60. He demonstrated, through practical examples, why and how information should be made user friendly. He warned delegates against the misappropriation of data for vested interest.

WORKSHOP RECOMMENDATIONS AND WAY FORWARD

Delegates noted that the workshop provided a means for sharing knowledge about R&D and innovation surveys and about other measures and indicators of science, technology and innovation (STI). However the process was just beginning.

61. The workshop recommendations for the way forward included the following:

- i. Delegates agreed on a set of core indicators for the surveys to be conducted. All of these for innovation were present in the South African innovation survey. All of the R&D indicators were covered by the South African R&D surveys, which had, in addition, a question on basic, applied and experimental development classification. The basic, applied and experimental development question was identified as an optional question as was the question on collaboration.
- ii. Delegates noted the importance of bibliometric and patent indicators but agreed that these were the responsibility of the Secretariat in the development of the African Innovation Outlook. The countries would focus on conducting the surveys and would report the results.
- iii. Delegates were urged to prepare budgets for conducting in-country surveys. The Workshop recommended that the South African survey questionnaires be used for the purpose of budget estimation as they provided an immediate guide to a number of variables and the structure of the survey. Additional work would have to be done to identify the sample or the need for a census in the sectors to be surveyed, but that work was country-specific. This recommendation did not preclude the use of variations on these questionnaires or of other questionnaires by participants.
- iv. In support of the recommendation (iii), the NEPAD OST Secretariat was invited to circulate the URLs for the South African survey questionnaires for the sectors to be surveyed, along with links to the UN International Standard Industrial Classification (ISIC), the Field of Science (FOS) and the Socio-Economic Objectives (SEOs).
- v. The NEPAD OST Secretariat shall elaborate one of the core questions namely the percentage of the total R&D expenditure allocated to the prioritized flagship programmes in the AU/NEPAD Science and Technology Consolidated Plan of Action.
- vi. The Workshop recommended that the Government and Higher Education Sectors -including hospitals, where it is appropriate- be surveyed for each participating country.

- vii. For the private sector, the recommendation was to survey both innovation and of R&D, but if that was not possible for budget or other reasons, to gather information on the core R&D variables.
- viii. The workshop recommended strongly that the participants remain in contact and share their knowledge of budget estimation and project management as the work develops. The intention was to build expertise in the surveying of R&D and innovation and then to share that knowledge with people from the remainder of the fifty three AU countries that had not participated in the Pilot Surveys

OFFICIAL CLOSURE

Closing Remarks by Mrs. Florence Imisa Weche, Deputy High Commissioner, High Commission of the Republic of Kenya in South Africa, Pretoria- Chair of AMCOST.

62. In her closing remarks, Mrs Weche said that Kenya as the current chair of AMCOST is looking forward to working with both the AU Commission and NEPAD to implement the CPA. She said this was in line with President Kibaki's address to the Kenyan Parliament. In his speech, President Kibaki emphasized the importance of science and technology as fundamentals to achieving NEPAD objectives and the millennium development goals. On behalf of Professor Kiamba (Permanent Secretary, Ministry of Science and technology, Kenya), she commended the effort undertaken by the project stakeholders to take this project from intentions to action. She urged countries to include STI related activities in their national budget to ensure ownership and sustainability.

Closing Remarks by Professor John Mugabe

63. Professor Mugabe thanked all participants for their commitment to the workshop. He acknowledged the high quality of the lectures by the Faculty; the pre-workshop preparations by the delegates as well as their active participation during the workshop. He expressed his gratitude to Sida and the Government of South Africa for their financial and technical support and all the partners that had contributed to the success of the workshop.

64. He urged participants to act as ambassadors for ASTI in their home countries and to make use of the technical expertise of NEPAD, AU Commission and the Faculty to ensure a successful STI pilot phase. He commended the African Union Commission for its participation in the workshop. He said that such a milestone will ensure a strong political clout for the project and promote a strong working relationship between the two teams. He noted that the workshop was a learning platform and that his team will use lessons learnt to improve on future activities.

Official closing of the training workshop by Dr Abdul-Hakim Elwaer, Director, Department of Human Resources, Science and Technology, AU Commission

65. In officially closing the workshop, Dr Elwaer stated that the AU Commission fully supports the ASTI initiative. He looked forward to the collection of data which will inform the STI policy formulation at the regional and continental levels. Dr Elwaer called on member states to make use of his good offices if political clout is required, during the implementation phase. He said that this workshop has started a process that will ring the bell for the remaining African

countries to join the wagon. He urged countries to institutionalize STI processes in order to ensure its sustainability.

66. While commending NEPAD and partners in providing the seed funding to start the process, he called upon AU Member States to progressively take the financing of the process in order to ensure ownership and long term sustainability.
67. Dr Elwaer concluded that his office and that of NEPAD OST will join hands to spearhead the CPA programmes and especially bring the ASTI initiative to fore. He thanked all stakeholders and ***declared the workshop officially closed.***



SWEDISH INTERNATIONAL DEVELOPMENT COOPERATION AGENCY

Annex I

African Science, Technology & Innovation Indicators (ASTII) Initiative

Training Workshop - March 10-14, 2008

PROGRAMME

Workshop Location:

Centurion Lake Hotel

1001 Lenchen Avenue North

Centurion

Gauteng, South Africa

Tel: +27-12-643 3600

Fax : +27-12-643 3636

<http://www.wheretostay.co.za/centurionlakehotel>

Sunday, March 09, 2008: Arrival and Registration

Arrivals, Faculty Meeting and Registration

Day One: Monday, March 10, 2008

08h00-9h00	Registration	
		Chair: Mrs. Estherine Lisinge Fotabong, NEPAD Advisor: Environment & Tourism
09h00-11h00	Session 1: OPENING CEREMONY	
	Welcome Remarks	Prof. John Mugabe (Director of NEPAD Office of Science and Technology and adjunct Professor at the Institute for Technological Innovation, University of Pretoria)
	Opening Remarks	Ambassador Stephen Willoughby (Acting CEO,NEPAD Secretariat)
		Embassy of Sweden AU Commission
	Keynote Address 1	<i>R&D and Innovation Indicators: Opportunities for Africa</i> (Fred Gault, OECD's Working Party of National Experts on Science and Technology Indicators (NESTI), Canada
	Keynote Address 2	<i>Science, Technology and Innovation Policy Making in Africa: Institutions and Practices</i> John Mugabe(NEPAD Office of Science and Technology)
	Official Opening	H.E. Mr. Mosibudi Mangena, <i>Minister of Science and Technology, Department of Science and Technology , Republic of South Africa</i>
	GROUP PHOTO	
11h00-11h30:	MORNING BREAK	

Day One: Monday, March 10, 2008 (continued)

	<p>In The Chair: <i>Ms Anneline Morgan, Director: African Cooperation, International Cooperation & Resources, Department of Science and technology, South Africa</i></p>
11h30-13h00	<p>Session 2: Development of National Systems of Innovation in Africa <i>Presenters :</i></p> <ul style="list-style-type: none"> ▪ Banji Oyelaran-Oyeyinka (Monitoring & Research Division, UN-HABITAT, Kenya and Visiting Professor, Innovation and Development, the Open University, UK)- <i>National Systems of Innovation in Africa: Features and Issues for Development</i> ▪ Bitrina Diyamett (Tanzania Commission for Science and Technology, Tanzania). <i>National Systems of Innovation: Some Important Theoretical Considerations and Critical Issues for Africa</i> ▪ Ousmane Kane (African Regional Centre for Technology, Senegal) - <i>Policy, Indigenous Knowledge and Lessons Learned.</i> ▪ Discussions
13h00-14h00	LUNCH BREAK
14h00-15h30	<p>Session 3: R&D and Innovation Indicators-Countries and Partners Experiences</p> <p><i>Facilitator:</i> Banji Oyelaran-Oyeyinka</p> <p><i>Presenters:</i></p> <ul style="list-style-type: none"> ▪ Claes Brundenius(Research Policy Institute, Lund University, Sweden)- <i>The Use of STI Indicators in Policy Research and Analysis</i> ▪ Ernesto Fernández Polcuch (UNESCO-UIS) <i>R&D and Innovation Indicators in Developing Countries</i> ▪ Koffi Marc Kouakou (African Development Bank, Tunisia)-<i>Lessons Learned on Science, Technology and Innovation Survey Design and Data Collection in African Countries.</i> ▪ Discussions
15h30-15h45	AFTERNOON BREAK
15h45-17h45	<p>Session 4: Interactive Session – Idem <i>Facilitator:</i> Banji Oyelaran-Oyeyinka <i>Presenters:</i> Countries and Partners Representatives</p>
17h45	END OF DAY ONE
19h30	<p>Dinner sponsored by the Department of Science and Technology, South Africa</p>

Day Three: Wednesday, March 12, 2008

Theme: Understanding Innovation Indicators

Chair: Dr. Mohamed Khalil Timamy, Coordinator of the Science and Technology Commission Lagos Office, HRST Department, AU Commission

08h00-10h00	Session 9: Innovation Indicators-Concept, Definitions, Issues and Approaches Presenter : Fred Gault ▪ Discussions
10h00-10h30	MORNING BREAK
10h30-12h30	Session 10: Innovation Indicators - Data Collection, Analysis and Reporting Presenter: Michael Kahn ▪ Discussions
12h30-14h00	LUNCH BREAK
14h00-16h00	Session 11: <i>Interactive Session</i> - Innovation Surveys In Practice ▪ Facilitators: Bitrina Diyamett and Astrid Szogs
16h00-16h30	AFTERNOON BREAK
16h30-18h00	Session 12a: Idem & Recap
18h00	END OF DAY THREE

Day Four: Thursday, March 13, 2008

Theme: Implementing National Surveys

Chair: Ernesto Fernández Polcuch (UNESCO)

08h00-10h00 **Session 12b- Recap of Day 3** - Bitrina Diyamett

Session 13: Statistical considerations for R&D and Innovation surveys

- Facilitators: Marlize Pretorius and Sieraag De Klerk (Statistics South Africa), Marc Kouakou (African Development Bank)

10h00-10h30

MORNING BREAK

Chair: Dr Fred Gault (OECD-NESTI)

10h30-12h30

Session 14: Determine Core Indicators for R&D Surveys

12h30-14h00

LUNCH BREAK

14h00-16h00

Session 15: Brainstorming on Possible Ethical Challenges

Facilitator : **Ames Dhai** (Adjunct Professor and Head at Bioethics, Director at Steve Biko Centre for Bioethics, University of the Witwatersrand, Johannesburg, South Africa)

16h00- 16h30

AFTERNOON BREAK & END OF DAY FOUR

16h30-18h00

Session 16: Determine Core Indicators for Innovation Surveys

Day Five: Friday, March 14, 2008

Theme: Recommendations

Chair: Dr Ousmane Kane, Director, African Regional Centre for Technology, Senegal

08h00-10h00 **Session 17: Some Issues Concerning Implementing National R&D and Innovations Surveys**

- Facilitators : Claes Brundenius (RPI) and Philippe Mawoko (NEPAD)

10h00-10h15

MORNING BREAK

10h15-11h30 **Session 18: Observatory of Science and Technology -A Discussion**

- Presenter: Michael Kahn
- Discussions

11h30-12h30 **Session 19: Faculty Recommendations and Wrap-up**

- Presenter: Fred Gault

OFFICIAL CLOSURE

12h30-13h00 **Mrs. Florence Imisa Weche**, Principal Counsellor, High Commission of the Republic of Kenya in South Africa, Pretoria. AMCOST Chair

Prof. John Mugabe (Director of NEPAD Office of Science and Technology and adjunct Professor at the Institute for Technological Innovation, University of Pretoria)

Dr Abdul-Hakim Elwaer (Director, Department of Human Resources, Science and Technology, AU Commission)



SWEDISH INTERNATIONAL DEVELOPMENT COOPERATION AGENCY

Annex II

TRAINING WORKSHOP ON AFRICAN SCIENCE, TECHNOLOGY AND INNOVATION INDICATORS

ATTENDANCE LIST

10-14 March 2008
Centurion Lake Hotel
Centurion
Gauteng, South Africa

AFRICAN UNION MEMBER STATES			
#	Name	country	Contact Details
01.	Mr Belarbi Yacine	Algeria	Chercheur Statisticien, Maître de recherche (CREAD), Centre de Recherche en Economie Appliquée au Développement Cell: + (213)54574897 belarbiyacine@yahoo.fr
02.	Ms Guilhermina Ines Pinto Lopes	Angola	Ministry of Science & Technology Av. Lenine 106/108, Luanda, Angola Tel +244-923-27-23-90 Guycunha10@yahoo.com.br
03.	Ms Martine DA/SOME	Burkina Faso	Technique Advisor to the Minister DA/SOME Martine Adviser (Technique) of the Minister in charge of Science and Technologies Tel : +226 50 30 28 98 Cell phone No :+226 70 11 82 13 Fax : +226 50 30 28 98 dasomem@yahoo.fr
04.	Mr Mamadou DIARRA	Burkina Faso	Inspecteur de l'enseignement secondaire chargé de mission au cabinet du Ministre Délégué Chargé de Mission to the Minister 03 BP 7130 OUAGADOUGOU 03 Tél : +226 70 74 84 01, +226 50 30 28 98 diarrapele90@yahoo.fr
05.	Mr IROUME Roger Noel	Cameroon	Chef de Service Cellule de gestion des carrières et des emplois scientifiques et technologiques Membre du Comité Point Focal national du NEPAD pour la S-T BP 1457 Yaoundé Tel. +237-22225202 Cell +237 77 33 54 33 iroumeroger759@hotmail.com
06.	Mr TCHOMTHE Séverin	Cameroon	Ingénieur Statisticien Economiste, Membre du Comité Point Focal National NEPAD-OST Institut National de la Statistique du Cameroun Tel. (237) 77 67 09 69, (+237) 22 03 18 48 stchomthe@yahoo.fr
07.	Prof. Maged Al-Sherbiny	Egypt	Assistant Minister for Science and Technology Tel. +202-2-7921282(4) Fax +202-2-792-1280 maged123@link.net
08.	Dr Nora Adel Zaki	Egypt	Technical Manager in the Ministry of Scientific Research Tel. +202-(202) 6901933/ Cell. 010-144-9069 Fax +202-2-792-1280 noraadel44@hotmail.com
09.	Mr Alemu Abebe	Ethiopia	Head S&T Information Department Ethiopian Science and Technology Agency

			Tel. 251-1-111-41-19 - Fax 251-1-551 88 29 alemuabebe2002@yahoo.com
10.	Mr Johnny Bindera	Ethiopia	Team leader of the Central Statistical Agency Tel. 251-1-111 99 78/251-913 0067/63 - Fax 251-1-155 420 Deputy Director General Economic Statistics Branch, Central Statistical Agency P.O.BOX 1143, Addis Ababa, Ethiopia Tel: (+251 11) 156 4226 johnnybidera@yahoo.com
11.	Mr Jean-Noël Biyogo	Gabon	Statisticien-Démographe, Directeur des Statistiques Démographiques Direction Generale de la Statistique et des Etudes Economiques (DGSEE) B.P. 2119 – Libreville – GABON Tel. +241 76 19 27 / 76 14 12 Fax +241 72 04 57 Cell. +24107 36 32 28 plan.dgsee@yahoo.fr ; biyogojeannoel@yahoo.fr Site Web : www.stat-gabon.ga
12.	Dr Elie YOUNBA	Gabon	Directeur de la Planification et des Statistiques Ministère de l'Enseignement Supérieur BP : 2217 Libreville, Gabon Tel : +241 760764 / 760784 Fax : +241 764543 / 76 39 09 Mobile +241 06 61 22 73 elyoumba@yahoo.fr ; elyoumb@hotmail.com http://www.educasup.gouv.ga , www.labogabon.com
13.	Mr Emmanuel K. Tetteh	Ghana	Research Scientist of the Science and Technology Policy Research Institute (STEPRI/CSIR) P. O. Box CT. 519 Cantonment – Accra Tel. 021-779401 / 021- 77 38 56 ekotetteh@yahoo.co.uk
14.	Mr David Kombat	Ghana	Assistant Chief Statistician Ghana Statistical Service P.O Box GP1098 Accra-Ghana Tel: (233)-24-4573170, (233)-21-671735 kombeey@yahoo.com
15.	Ms Cecilia K. Nzau	Kenya	Principal Research Officer Ministry of Science and Technology Head – Focal Point Secretariat P O Box 30568,-00100, Nairobi, Kenya Tel: +254 20 219420, +254-203508714, +254-202218006 Fax: +254 20 215349, 20 2215349 nzau@scienceandtechnology.go.ke ; nzaucecilia@yahoo.com
16.	Ms Rosemary Kongani	Kenya	Statistics Officer Kenya National Bureau of Statistics Ministry of Planning and National Development Republic of Kenya Tel: +254-2-340-929

			Fax: +254-20-315977 director@cbs.go.ke , rosemuside@yahoo.com
17.	Mr Richard M. Liahona	Kenya	Research Officer Ministry of Science and Technology PO Box: 30568-00100, Nairobi, Kenya Tel: +254 20219420, 254-720877502 Fax: +254 20215349 mavisi@scienceandtechnology.go.ke
18.	Mr Tsepo Ntho	Lesotho	Senior Research officer Department of Science and technology Tel. +266 223 13632 Fax +266-22310054 nthot4@yahoo.com
19.	Mr Lefa Thamae	Lesotho	Senior Research officer Department of Science and technology Tel. +266 223 13632 Fax +266-22310054 lefathamae@yahoo.com
20.	Dr. Alfred Maluwa	Malawi	Deputy Director of Science and Technology Tel 265-1 774 769 - Fax 265-774 778 Cell Phone 265-9 612 700 aomaluwa@mistmw.org , aomaluwa@yahoo.com
21.	Ms. Angela Msosa	Malawi	Chief Statistician National Statistics Office Fax 265-525 130 Cell Phone 265-9391 771 amsosa@statistics.gov.mw , angela_msosa@yahoo.com
22.	Prof. M.B. Dicko	Mali	Chef de la Division recherche scientifique & technologique Ministere de Recherche Scientifique et Technologique mbdicko@yahoo.fr
23	Mr Vinima Traore	Mali	Ingénieur en Statistiques & Chef de Section Recensement & Enquêtes démographiques Direction Nationale de la Statistique et de l'Informatique BP : 12 Tél. (223) 221 52 85 - Fax (223) 222 48 73 Cell. (223) 310 43 80/(223) 6035220 - Email : traorevini@yahoo.fr
24.	Eng. Julia Eva B. Zita	Mozambique	Direction of Planning, Statistics & Cooperation Ministry of Science & Technology Av. Patrice Lumumba 770 Maputo, Mozambique Tel. +258-827-86-1041 Fax +258-21-352-860/352-880 Julia.zita@mct.gov.mz
25.	Mr Mety Oreste Gondola	Mozambique	Direction of Planning, Statistics & Cooperation Ministry of Science & Technology Av. Patrice Lumumba, 770, Maputo Tel.: (+258 1) 35 28 5 3/ 35 28 00 Fax: (+258 1) 35 28 80 Mety.gondola@mct.gov.mz
26.	Dr Willie Siyanbola	Nigeria	CEO, National Centre for Technology Management

			(NACETEM) and DG, FMSN, Federal Ministry of Science and Technology Obafemi Awolowo University Ile-Ife, Osun-state, Nigeria GSM: +234-803-344-9687; +234-805-942-7349 wsybola@yahoo.com
27.	Dr Almamy Konte	Senegal	Director Direction of Technology Research Ministry of Scientific Research Tel. 221-33 822 92 48, Fax 221 33 822 9058 Cell Phone 221-77 638 55 48 Almamy@ugb.sn
28	Mr Djibril Ndoye	Senegal	Chef de Division des statistiques sociales, du suivi des conditions de vie et de la pauvreté Agence Nationale de la Statistique et de la Démographie (ANSD) Tel: +221 33 869 21 66 Mobile: +221 77 652 34 20 djindoye@yahoo.fr
29.	Ms Marjorie Pyoos	South Africa	GE: Socio-Economic Partnerships Department of Science & Technology Private Bag X894 - PRETORIA 0001 Tel. 012 843 6833 Fax: 086 681 0296 Felicity.Williams@dst.gov.za
30.	Ms Nkuli Shinga	South Africa	Manager, Department of Science & Technology Sector R&D Planning Extension no: 012 843 6411 Fax no: 0866810203 nkuli.shinga@dst.gov.za
31.	Ms Anneline Morgan	South Africa	Manager, Department of Science & Technology African Cooperation Tel. (012) 843 6334 Cell. 082 523 4918 anneline.morgan@dst.gov.za
32.	Dr Botlhale O. Tema	South Africa	Advisor, African Affairs: International Cooperation and Resources Department of Science and Technology CSIR Campus Meiring Naude Road Brummeria, Pretoria Tel: +27 (0) 12 843 6343 Fax: +27 (0) 12 349 1058, +27 (0) 86 674 23 77 Cell: +27 (0) 82 389 3106 botlhale.tema@dst.gov.za
33.	Mr Bongani Maseko	South Africa	Deputy Director, African Cooperation (AU/NEPAD) Department of Science and Technology Private Bag X894 PRETORIA 0001 Tel. +27 12 843 6379 Mobile: +27 82 387 9004 Fax 2/Email: 086 674 2866 Bongani.Maseko@dst.gov.za
34.	Mr Lindile Adons	South Africa	NACI Department of Science & Technology

			Building 53 CSIR Campus, Meiring Naude Road, Brummeria, Pretoria, South Africa Tel. +27-12-843-6509 Lindile.adons@dst.gov.za
35.	Dr Hermi Boraine	South Africa	NACI Senior Specialist Department of Science & Technology Building 53 CSIR Campus, Meiring Naude Road, Brummeria, Pretoria, South Africa Tel. +27-12-843-6498 Hermi.boraine@dst.gov.za
36.	Ms Blandina Mkayula	Tanzania	Ministry responsible for Science and Technology PO Box 2645 Dar-es-Salaam, Tanzania Tel. +255-22-2115758 bm kayula@yahoo.com , bm kayula@msthe.go.tz
37.	Mr Ibrahim D. Kalengo	Tanzania	Senior Statistician, Macro Economy Division Ministry of Planning, Economy & Empowerment P. O. Box 9242, Dar Es Salaam Off: +255 22 2121 895 Mob: +255 784 292 113 Telephone: +255 22 2112681 Fax: +255 22 2115519 idx07@yahoo.co.uk
38.	Ms Imelda Atai Musana	Uganda	Principal Stastician, Uganda Bureau of Statistics Tel: 256-772-680087 imelda.atai@ubos.org
39.	Mr Joshua Mutambi	Uganda	Principal Industrial Officer Ministry of Tourism, Trade and Industry Tel:256-782-679530 jmutambi@yahoo.com
40.	Ms Batista Chilopa	Zambia	Central Statistical Office P.O. Box 31908 Lusaka 10101 Zambia Mobile: +260-977-39417 Fax: +260-211+253468 bmwale@zamstats.gov.zm ; bchilopa@hotmail.com
41.	Mr Lackson Tonga	Zambia	Ministry of Science Technology and Vocational Training P.O. Box 50464 Lusaka 10101, Zambia Telephone: +260-1-252073 Mobile: +260-977-307370, +260-955-307370 Fax : +260-1-252089. ltonga@mstvt.gov.zm

MEMBERS OF THE FACULTIES			
#	Name	Institution	Contact Details
42.	Prof. Claes BRUNDENIUS	Research Policy Institute, LUND University	Ideon Alfa 1 P.O. Box: 117, Scheelevägen 15 SE-22101 Lund, Sweden Telephone: +46 46 222 41 22 Fax: +46 46 14 69 86 Claes.Brundenius@fpi.lu.se
43.	Ms Astrid Szogs	Research Policy Institute, LUND University	LUND University Sweden Tel. +46-46-2220388 Mobile +46-709-767667 astrid.szogs@cicle.lu.se
44.	Dr. Fred GAULT NESTI Chair & Director	OECD -NESTI	R.H. Coats Building 7A, Ottawa, Ontario K1A 0T6 Canada Tel: +1 613 951 2198 Fax: +1 613 951 9920 Fred.Gault@statcan.ca
45.	Prof. Banji Oyelaran-Oyeyinka	Monitoring & Research Division (MRD) UN-HABITAT	P.O. Box 30030 00100 UN-Gigiri Room:N-330 Nairobi Kenya Tel: 254-020-7623041 Fax:254-020-7624736 oyebanji.oyeyinka@unhabitat.org
46.	Prof. Michael Kahn Executive Director	CeSTII-HSRC	Private Bag X 9182 Cape Town 8000 South Africa Tel: +27 (0)21-4667804 Fax: +27 (0)21-4611533 Cell: +27 (0)82-8549777 mkahn@hsrc.ac.za
47.	Dr Ousmane Kane	African Regional Centre for Technology	Executive Director ARCT P.O. Box 2435, Dakar, Senegal Phone: (221) 33 823 77 10 Fax: (221) 338 23 7713 ouskane@orange.sn ; arct@orange.sn
48.	Mr Koffi Marc KOUAKOU	African Development Bank (AfDB)	Statisticien. BP 323, 1002 Tunis Belvedere Tunis, Tunisia Tel. +216-71103656/22946366 Fax : (216) 71-834436/ 10 37 43 m.koffi@afdb.org
49.	Mr Ernesto Fernandez-Polcuch	UNESCO Institute for Statistics (UIS)	C.P.6128, Succ., Centre-Ville Montreal (Quebec), Canada e.fernandez-polcuch@uis.unesco.org
50.	Ms Bitrina Diyamett	Tanzania Commission for Science and	Senior Scientific Officer COSTECH Building

		Technology COSTECH	P.O. Box 4302 Ali Hassan Mwinyi Road, Kijitonyama (Sayansi) Dar es Salaam, Tanzania Tel: 255-22-2700752/45/46 Fax: 255-22-2775313/4 bdiyamett@costech.or.tz , bitrind@yahoo.com
51.	Prof. Ames Dhai	Steve Biko Centre for Bioethics and Human Research Ethics Committee Faculty of Health Sciences	Director & Co-Chair University of the Witwatersrand 7 York Road, Parktown 2193 Johannesburg, South Africa Phone +27 117172718 Fax +27 117172639 Amaboo.Dhai@wits.ac.za
52.	Ms Marlize Pretorius	Statistics South Africa STATS SA	CPI Development Project PO Box X44. Pretoria, 0001 South Africa MarlizeP@statssa.gov.za
53.	Prof. Mario Scerri	Tshwane University of Technology (TUT)	Dean Faculty of Economic Sciences Tel: +27 12 521 0530 Fax: +27 12 703 5014 Cell: +28 82 333 7521 mncerri@mweb.co.za

DIGNITARIES			
#	Name	Position	Contact Details
54.	Hon. Mosibudi Mangena	Minister	Department of Science & Technology Private Bag X 727 Pretoria, 0001 Cell: 082 411 9348 Tel: 012 843 6798 Fax: 012 349 1041 girly.makoetjie@dst.gov.za
55.	Ms Florence Imisa Weche	Deputy High Commissioner	High Commission of the Republic of Kenya info@kenya.org.za , fweche@kenya.org.za
56.	Mr Jon Eklund	First Secretary	Embassy of Sweden in South Africa jon.eklund@sida.se
57.	Dr. Ros-Mari Bålów, PhD	Senior Research Adviser Swedish International	Department for Research Cooperation, Sida/SAREC SE-105 25 Stockholm, Sweden Telephone: +46 (0)8 698 5793 ros-mari.balow@sida.se http://www.sida.se

AFRICAN UNION COMMISSION			
#	Name	Position	Contact Details
58.	Dr. Abdul-Hakim Elwaer	Director	Human Resources, Science and Technology African Union Commission P.O.Box 3243, Addis Ababa, Ethiopia. Tel: +251-11-5517523 Fax: +251-11-5517844 aelwaer@africa-union.org www.africa-union.org
59.	Dr. Ahmed Hamdy	Head	Human Resources, Science and Technology department African Union Commission P.O. Box 3243, Addis Ababa, Ethiopia. Tel: +251-11-5517700 Ext 349 Fax: +251-11-5517844 or 251-11-5505928 hamdya@africa-union.org ;
60.	Dr. Mohamed Khalil Timamy	Coordinator	Lagos Office, Human Resources, Science and Technology Department Africa Union Commission Tel: 234 8060328131 mhktimamy@yahoo.co.uk

NEPAD SECRETARIAT			
#	Name	Position	Contact Details
61.	Amb. Stephen O. Willoughby	Acting CEO	NEPAD Secretariat PO Box 1234, Halfway House Midrand, 1685 Tel. +27 11 313 3716 Fax +27 11 313 3684 Olukoredew@nepad.org http://www.nepad.org
62.	Mrs Estherine Lisinge Fotabong	Advisor	NEPAD Secretariat Advisor, Environment & Tourism Tel. +27 11 313 3893 estherinef@nepad.org
63.	Prof. John Mugabe	Advisor	NEPAD Office of Science and Technology CSIR Campus Building 10F, 1 st Floor Meiring Naude Rd PO Box 395 Pretoria 0001, RSA Tel. +27-128413688/3653 Fax +27-128414414 john@nepadst.org
64.	Dr Philippe Kuhutama Mawoko	Programme Coordinator	NEPAD Office of Science & Technology African Science, Technology & Innovation Indicators Initiative (STII) CSIR, Building 10F, 1 st Floor Tel. +27 (12) 841 2982 Mobile +27 (72) 599 8257

			Fax +27 (12) 841 4414 pkmawoko@nepadst.org http://www.nepadst.org
65.	Prof. Luke Mumba	Director, SANBio	Southern African Bioscience Initiatives Network CSIR Campus, Building 20, Meiring Naude Rd Box 395 Pretoria 0001 Building 20 South Africa Tel: +27 12 841-3904/03 Fax: +27 12 841-3906 lmumba@sanbio.co.za http://www.nepadst.org/sanbio
66.	Mr Lukovi H.M. Seke	Research Assistant	NEPAD Office of Science and Technology CSIR Campus, Building 10F, 1 st Floor PO Box 395 Pretoria 0001, South Africa Tel. +27-128413294 Fax +27-128414414 seke@nepadst.org
67.	Ms Marilyne Jensen	Assistant	NEPAD Office of Science and Technology CSIR Campus, CSIR Building 10F, 1 st Floor Meiring Naude Rd PO Box 395 Pretoria 0001, South Africa Tel. +27-128413653 Fax +27-128414414 science@nepadst.org
68.	Ms Nancy Ngum	Assistant	NEPAD Office of Science and Technology CSIR Campus, CSIR Building 10F, 1 st Floor Meiring Naude Rd PO Box 395 Pretoria 0001, South Africa Tel. +27 (12) 841 2833 Mobile +27 (72) 2089165 Fax +27 (12) 841 4414 nancy@nepadst.org http://www.nepadst.org
69.	Ms Abongile Dalasile	Assistant	Southern African Bioscience Initiatives Network CSIR Campus, Building 20, Meiring Naude Rd Box 395 Pretoria 0001 South Africa Tel: +27 12 841-3904/03 Fax: +27 12 841-3906 Adalasile@csir.co.za http://www.nepadst.org/sanbio/