

# ASTII POLICY BRIEF SERIES

DECEMBER 2013 - NO 03

## ASTII CONTRIBUTING TO AFRICA'S TRANSITION TO AN INNOVATION-LED AND KNOWLEDGE-BASED ECONOMY



## EXECUTIVE SUMMARY

*The African Science, Technology and Innovation Indicators (ASTII) Initiative was launched in 2007 by the New Partnership for Africa's Development (NEPAD) as one of the programme areas of Africa's Science and Technology Consolidated Plan of Action (CPA). It was designed through a participatory process involving senior policy-makers and researchers from most African Union (AU) member states. The design process began in November 2003 when the first African Ministerial Conference on Science and Technology (AMCOST) held in Johannesburg, South Africa decided that through AU and NEPAD, member states should develop and use common Science, Technology and Innovation (STI) indicators to measure and compare their science and innovation systems. AMCOST II meeting of September 2005 in Dakar, Senegal further emphasised the importance of science, technology and innovation indicators in the African context. "Science, technology and innovation (STI) indicators are crucial for monitoring Africa's scientific and technological development. They are useful for formulating, adjusting and implementing STI policies. Indicators can be used to monitor global technological trends, conduct foresight exercises, and determine specific areas of investment. An example is the target of a ratio of R&D spending to GDP of 1% for African countries"*<sup>1</sup>

*In September 2005, AMCOST adopted the CPA that has a specific programme of work on the development and use of STI indicators. The programme has two interrelated projects. The first project focuses on the development and adoption of African common STI indicators (ASTII) while the second project is on the establishment of the African Observatory for Science, Technology and Innovation (AOSTI), as a repository for STI statistics for the continent. ASTII was launched in Maputo, Mozambique in 2007 to contribute towards a better quality of STI policies at national, regional and continental levels. ASTII specifically supports and strengthens the capacity of Africans to develop and use STI indicators in development planning and policy. The ASTII Initiative supports both evidence-based STI policy formulation and review; enhances regional cooperation and collaboration on S&T and innovation activities or programmes; strengthens Africa's human and institutional capacities for STI indicators and related surveys; contributes to the production of reliable African STI indicators and related data sets available and in use. Under ASTII participating countries undertake R&D and Innovation surveys to produce the data needed to compile indicators on the status of STI. Thus, 19 African countries participated in the first pilot phase (2007-2010).*

*Key achievements of the pilot phase includes establishment of an intergovernmental committee to be the overall governance structure of ASTII; creation of ASTII national focal points; training workshops to build human capacities in R&D and innovation surveys; and production and disseminating of the first African Innovation Outlook (AIO-2010) report. A 2<sup>nd</sup> phase of ASTII which builds on the experience of the previous phase was launched in May 2011 in Addis Ababa. This Phase has seen the implementation of the second project of the CPA on STI indicators. The African Observatory for Science, Technology and Innovation Indicators (AOSTI) has been created by the African Union in Malabo, Equatorial Guinea. The number of participating countries has increased to 35 and the interest to participate is growing. The second edition of the African Innovation Outlook (AIO 2013) has been published.*

*This Policy Brief shows that ASTII has stimulated AU member states to start developing STI indicators. It has enabled some countries to start conducting R&D and innovation surveys and to build national capacities for indicators to inform STI policy formulation and review. AU Member States have made strides to create better understanding of the value of STI indicators and the knowledge thereof and are moving towards institutionalizing ASTII through national focal points. Both the first and second phases of ASTII have been a period of experimentation and learning since it is the first time that most AU member states individually and collectively started to work on STI indicators. NEPAD has been instrumental and successful in coordinating and ensuring the success of ASTII and in the establishment of AOSTI. The government of Sweden through the Swedish International Development Agency (Sida) has been the main sponsor of ASTII and participating countries are being encouraged to establish budget lines in support of STI data collection and the ASTII Initiative.*

<sup>1</sup> African Innovation Outlook 2010

## **INTRODUCTION AND BACKGROUND**

Science, Technology and Innovation (STI) are engines of growth in any economy. Realising that Africa can also benefit from STI activities, in September 2005 the African Union Ministerial Council in charge of Science and Technology (AMCOST) adopted the African Science and Technology Consolidated Plan of Action (CPA)<sup>2</sup> which articulates the need to utilise STI to boost economic growth and improve the lives of the African people. The overall goal of the Initiative is to contribute towards a better quality of STI policies at national, regional and continental levels. ASTII specifically supports and strengthens the capacity of Africans to develop and use STI indicators in development planning and policy. The ASTII Initiative supports both evidence-based STI policy formulation and review; enhances regional cooperation and collaboration on S&T and Innovation activities or programmes; strengthens Africa's human and institutional capacities for STI indicators and related surveys; contributes to the production of reliable African STI indicators and related data sets available and in use.

The CPA has a specific programme of work on the development and use of STI indicators. This programme has two interrelated projects. The first project focuses on the development and adoption of African common STI indicators while the second project is on the establishment of the African Observatory for Science, Technology and Innovation (AOSTI) as a repository for STI statistics on the continent. The challenges facing Africa are how to link STI to poverty reduction, job creation, sustainable livelihoods and improved well-being of citizens; and how to build capacity and competencies to innovate? As countries engage in knowledge intensive activities, how will Africa expand its knowledge? Understanding the concepts of STI will allow for prudent policy formulation and a research agenda that will address economic and social challenges. It is therefore imperative for Africa to develop sustainable systems for measuring STI activities based on a clear understanding of national and regional innovation systems. The absence of such measurements serves as an obstacle for the design and implementation of STI policies and strategies in many developing economies in Africa. Measuring STI is fundamental for the formulation of national policies and in the absence of relevant indicators this process can prove cumbersome. Until 2007, when the implementation of the CPA's programme on STI indicators commenced, most African countries did not have STI indicators or adequate means to produce them.

Good STI indicators can be used to improve the quality of policies and inform planning that can enhance Africa's scientific and technological development. Indicators can also be used to monitor the extent to which a country is using STI for socio-economic development. The measurement system will also provide means for comparing the indicators at regional and international level. More important, the STI measurement system will help to effectively demonstrate and communicate the link between STI and development goals. The development and collection of STI indicators should go beyond counting innovation outputs by providing a detailed understanding of the relationship between trade and STI, and means for statistical catch-up for countries that have limited capacities in STI.

### **Why ASTII?**

The call by AMCOST to initiate the collection of STI indicators bore fruit when Programme 5.1 of the CPA which is the African Science, Technology and Innovation Indicators (ASTII) was launched in Maputo, Mozambique in 2007. Under ASTII participating countries were to undertake R&D and Innovation surveys to produce the data needed to compile indicators on the status of STI. The African Intergovernmental Committee (AMCOST Steering Committee) on African Science, Technology and Innovation Indicators that was created at AMCOST II meeting met for the first time in Maputo, Mozambique in 2007. The AMCOST Steering Committee resolution in Maputo gave clarity to ASTII and its implementation. This is noted in the AMCOST Steering Committee decision that:

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<sup>2</sup> Both English and French versions of the CPA available on the then NEPAD office of Science and Technology website: [www.nepadst.org/doclibrary/pdfs/ast\\_cpa\\_2007.pdf](http://www.nepadst.org/doclibrary/pdfs/ast_cpa_2007.pdf)

*“African countries shall use the existing internationally recognised STI manuals and/or guidelines, particularly the Organisation for Economic Cooperation and Development’s (OECD) Frascati (OECD, 2002) and Oslo Manuals (OECD/Eurostat, 2005) to undertake Research and Development (R&D) and Innovation surveys respectively. They may use these manuals, and experience gained in undertaking the surveys, to develop African STI manuals or guidelines”.*<sup>3</sup>

The ASTII initiative encourages participating countries to adopt policies that support the collection of R&D and Innovation statistics in line with the Cairo Declaration of the extraordinary conference of AMCOST of 23-24 November 2006 which made the following recommendation: *“promote research and development (R&D) and develop innovation strategies for wealth creation and economic development by allocating 1% of Gross Domestic Product (GDP) to R&D by 2010. The 1% target was also agreed and highlighted in the Khartoum Decision (EX.CL/Dec.254) (VIII)”*<sup>4</sup>. Thus through ASTII Africa has for the first time developed internationally recognized mechanisms and guidelines to assess research and development (R&D) and Innovation programmes in African countries and monitor their implementation including the decision to invest 1% of Gross Domestic Product (GDP) in R&D. Further, the Initiative encourages participating countries to promote investments in high quality data infrastructure to support the collection of R&D and Innovation statistics.

## Geographical Scope

The first Phase of ASTII (2007-2010) was implemented in 19 countries namely: Algeria, Angola, Burkina Faso, Cameroon, Egypt, Ethiopia, Gabon, Ghana, Kenya, Lesotho, Malawi, Mali, Mozambique, Nigeria, Senegal, South Africa, Tanzania, Uganda and Zambia. Table 1 gives a progression in AU member states participation in ASTII training workshops and national R&D and/or Innovation surveys under ASTII 1 & 2. In the 2<sup>nd</sup> phase (2010-2013), the number of countries participating in the Initiative increased from 19 to 35. The 16 additional countries are: Benin, Botswana, Burundi, Cape Verde, Chad, Congo, Democratic Republic of Congo, Equatorial Guinea, Liberia, Mauritius, Namibia, Niger, Rwanda, Togo, Tunisia and Zimbabwe.

## How ASTII has Addressed the Need for STI Measurements in Africa

The activities within the ASTII Initiative are geared towards developing the requisite capacity to produce STI indicators and further to enable the use of those indicators to inform policy and decision-making in African countries. Prior to the launch of the ASTII Initiative, most of the AU member states did not have STI data that was recognised as part of national statistics. One of the main goals of the programme was to develop capacity in the member states for collecting STI data as part of national statistics. In order to achieve this, the NEPAD Agency requested member states to establish national working groups on STI indicators which were led by ministries responsible for science and technology and the national statistical office. These teams were then trained on methodologies for the conduct of R&D and Innovation surveys, analysis of data and reporting. This training had representatives from at least the two institutions in order to build a national core team for STI indicators survey. The surveys carried out were also led by the two government departments from analysis through to publication of the national reports. The data from the surveys has now been institutionalised as part of national statistics in each of the participating countries.

<sup>3</sup> AMCOST Meeting 2005:38

<sup>4</sup> (Source: [http://www.nepadst.org/doclibrary/pdfs/cairo\\_declaration\\_2006.pdf](http://www.nepadst.org/doclibrary/pdfs/cairo_declaration_2006.pdf))



**Table 1: AU Member States Participation over Time: 2007-2013**

2007 – 2010	2012	2013
01. Algeria	20. Cape Verde	29. Benin
02. Angola	21. Equatorial Guinea	30. Botswana
03. Burkina Faso	22. Liberia	31. Burundi
04. Cameroon	23. Mauritius	32. Chad
05. Egypt	24. Namibia	33. Congo
06. Ethiopia	25. Niger	34. Congo, Dem. Rep.
07. Gabon	26. Togo	35. Rwanda
08. Ghana	27. Tunisia	
09. Kenya	28. Zimbabwe	
10. Lesotho		
11. Malawi		
12. Mali		
13. Mozambique		
14. Nigeria		
15. Senegal		
16. South Africa		
17. Tanzania		
18. Uganda		
19. Zambia		

The ASTII Initiative has focused on well-defined R&D and Innovation indicators for international comparison. With respect to R&D the surveys cover four sectors namely; business enterprise sector; government sector; education sector; and private non-profit organizations (PNPs). The indicators of interest are Gross Domestic Expenditure on R&D (GERD) by source of funds and sector of performance; R&D personnel (headcount and full-time equivalent) by gender, sector of performance, level of formal qualification and occupation, as well as researchers by gender and field of study/research.

Under innovation surveys the ASTII Initiative covers the following indicators: both product and process innovation; ongoing or abandoned innovation activities; innovation activities and expenditures; sources of information and cooperation for innovation activities; effects of innovation during the last two years; factors hampering innovation activities; Intellectual Property Rights; and organization and marketing innovations. AU member states are also encouraged to build indicator sets that address local needs and priorities. Innovation indicators can provide a breadth of information on the innovation process at the firm level. They help to identify motives and obstacles to innovation, changes in the way firms operate, kinds of innovation activity that they engage in, and the types of innovations that they implement. In terms of innovation process as a system, innovation surveys provide information on firms' linkages with other actors in the economy and on the methods they use to protect their innovations. This kind of information would place governments in a strong position to deal appropriately with specific policy issues that may arise.

## **ASTII ACHIEVEMENTS AND IMPACTS**

### **Achievements**

#### **1) Human and Institutional Capacity at National Level Developed**

One of the major achievements of the ASTI Initiative has been the building of capacities of member states to collect and analyse data on STI and to produce national reports. Prior to 2007, with the exception of South Africa and Tunisia, AU member States did not have units established within their statistics systems that were dedicated to collecting data on STI. Since the inception of ASTII, training programmes have been conducted to build capacity (human and institutional) in the member states in data collection. Annex 1 provides a list of ASTII national focal who have benefitted from these training courses. The training has been facilitated by member states that already had

capacity with some support from some of the partners. In this case, the Human Science Research Council (HSRC) of South Africa played an important role by committing its centre of STI statistics (CeSTII) to conduct tailor-made training programmes in the SADC member states. For the other countries, training sessions were jointly facilitated by NEPAD Agency and its partners. The capacity building yielded a lot of benefits considering that it moved countries from a status of having no STI data collection systems to a point where they were able to collect their own national statistics.

Through ASTII more than 150 experts from 35 AU member States have been trained and through this training a number of countries have acquired the capacity to collect, analyse, and produce national R&D and Innovation survey reports. Egypt, Ethiopia, Ghana, Kenya, Nigeria and South Africa are among countries that have published national reports. Country reports from these countries form part of the broader African Innovation Outlook and also inform the national science, technology and innovation development and benchmarking.

## **2) R&D and Innovation Surveys at National Level Supported**

Another area of success of ASTII has been the increase in the number of participating countries from 19 at the beginning of the initiative in 2007 to 28 between 2007 and 2011. This number has risen to 35 by 2013. 28 countries have so far produced STI indicators and/or are in the process of conducting surveys and producing indicators by February 2014. Overall, countries participating in ASTII have demonstrated high commitment to the objectives of ASTII which has accounted for the good progress the programme has registered. The interest from member States is growing and the initiative continues to work on developing the capacity of African Union member states to conduct both R&D and Innovation surveys. In order to catalyse the conduct of surveys on the continent NEPAD has provided funding to 18 countries out of the 28 that are conducting surveys. The remaining 10 have self-funded the surveys.

## **3) Dissemination of ASTII Knowledge**

Dissemination of STI indicators is important within and beyond the countries that are participating in the ASTII Initiative in order to create awareness and generate interest in the value of indicators on the continent. The initiative has generated interest among AU member States resulting in the increased requests from countries to participate in the ASTII Initiative. Dissemination has also helped to secure political buy-in at government level, to raise wider public awareness at grassroots level, and to garner support from key stakeholder groups. This has been demonstrated by the number of AU member States that co-funded or fully funded their R&D and Innovation national surveys and the number of collaborations with partners (e.g., UNESCO Institute for Statistics (UIS), Research Policy Institute (RPI) of Lund University in Sweden, African Academy of Sciences (AAS); African Technology Policy Studies Network (ATPS), Internal Food Policy Research Institute-Agricultural Science & Technology Indicators (IPFRI-ASTI).

Dissemination of ASTII knowledge has been achieved through publications, conferences, workshops and media briefings in order to promote awareness of its activities and to showcase its outcomes. In terms of publications, ASTII has produced the African Innovation Outlook (AIO), policy briefs<sup>5</sup>, special research papers, brochures, and newsletters. These publications are also publicly available online.

## **4) Case Studies on National Systems of Innovation (NSI)**

As policy and indicator analysts are well aware, indicators only occasionally relate neatly to a single factor issue; more often than not they relate to a range of matters and only partially to each. Any broad information or monitoring system will need to be supplemented with case studies or specialised surveys when specific, in depth analysis is required. It therefore becomes imperative to study the national system of innovation (NSI) of any given country and ask a number of issues related to its structure, its dynamics but more significantly its role in improving living conditions of the population.

In this regard, ASTII also provided for some independent research component aimed at widening scholarly inputs on

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<sup>5</sup> The ASTII Policy brief series already have two products released in July 2013: (a) Scientific productivity of the African Union member States: 2005-2010; and (b) Monitoring Africa's progress in Research and Experimental Development (R&D) investments. The Link on the AOSTI web site is <http://aosti/index.php/policy-briefs>

the programme and also charting directions for the future of the programme. The independent researches component of ASTII was also aimed at encouraging dialogue between ASTII and the science and policy making community in Africa. In line with this, the NEPAD Planning and Coordinating Agency made a research call for proposals entitled “Research and innovation for economic development in Africa: the role of Science, Technology and Innovation (STI) Indicators”.

Four case studies were commissioned to interrogate a number of issues that impact on NSI in Senegal, Nigeria, Malawi, and South Africa. The four research papers are in print and will be published in the first quarter of 2014.

### **5) Processes for Building Regional STI Data Collection System have been Initiated**

Regional Economic Communities offer a lot of opportunities for building regional STI data systems as they are also strengthening their programmes in STI and education. Technical Support has been provided to Economic Community for Central African States (ECCAS), Economic Community for West African States (ECOWAS), Common Market for Eastern and Southern Africa (COMESA) and Southern African Development Community (SADC). ASTII’s involvements with RECs have focussed mainly in areas such as (a) Building the requisite human capacity for STII; (b) development of a regional strategies to foster innovation related to R&D; (c) identification of research institutions in each sub-region that have reached world-class level in terms of research achievements and their fields of specialization; (d) creation of a database of science, medical, technical and engineering research institutions; (e) creation of awareness among parliamentarians and specialised committees of parliaments on the importance and utilization of STI in policy making; and (e) adoption of innovation ecosystem baseline survey tools and internationally comparable Innovation indicators measurement.

### **6) A Coordination Mechanism of STI Data within the AU/NEPAD System has been Developed**

The NEPAD Agency and the AUC have worked together over the years to build a core team that has coordinated the ASTII Initiative. The team was initially built at the NEPAD Secretariat and since two years ago another team has been established in Malabo in Equatorial New Guinea following the support provided by the Government of Equatorial Guinea and the AU Summit decision to establish the African Observatory for Science, Technology and Innovation (AOSTI). The ASTII Initiative has played a pivotal role in ensuring that the AOSTI takes off by providing technical support. With the establishment of the NEPAD Science, Technology and Innovation Hub (NSTIH), the two teams have built strong working relationship during the current reporting period where they are implementing the activities together.

### **7) Partnerships have been Built between the ASTII Initiative and Other International Programmes on STI Data**

The ASTII Initiative which took off with initial partnership between the then NEPAD Secretariat and University of Lund in Sweden has over the years of implementation seen several partners coming to join. Most of the partners have supported ASTII in development of training modules, undertaking regional and in-country trainings, hosting of focal points at their centres, and promotion and advocacy for the ASTII agenda. ASTII and its partners have also contributed to the development of the international STI measurement frameworks.

## **Impacts**

The above interventions by NEPAD/ASTII are important because a number of AU member states now have national STI statistics which they can develop their policies out of. As the case studies from Kenya, Nigeria and Tanzania covered in Box 1 indicate, member states have made decisions based on the messages that have come out from the national survey data. The ASTII Initiative has been unique in that it has been readily implemented by member states and requests for countries to join the Initiative keep coming from the countries that have not yet launched their national surveys. Legitimization of STI data as part of national statistics has brought in a high degree of independence among the member states which were traditionally dependent on sources outside the continent for them to get status report on STI in their countries. This was not a reliable source given that more often than not, statistics on most African countries were missing due to non-availability of data. It was therefore uncommon to get

data tables where the majority of the African countries had blanks for most of the parameters.

The socio-economic impacts of ASTII and its impacts on the science community are likely to be felt in the medium to long term because of the nature of the programme. Suffice to say that at the policy formulation and implementation level African countries are using the data in the African Innovation Outlook in planning and monitoring the performance of their programmes and increasingly allocating funds for the conduct of STI surveys. All the 35 countries participating in the ASTII initiative have contributed both in-kind and cash to the costs of conducting national surveys. Statistics from ASTII are also cited in many international fora as a reliable source of data. Thus, the ASTII Initiative has institutionalized a culture of collection and use of STI statistics on the continent. It is expected that STI data will have similar impacts on other sectoral policies particularly; Education, Commerce and Industry (Trade and Investment), Small and Medium Enterprises (SMEs) and overall Economic Strategies on the continent. To achieve better impact and the use of STI indicators in development, experts must embark on strategic popularization, sensitization and advocacy among stakeholders, policy makers and the executives in government and the private sector.

## **CHALLENGES**

It has been observed that the transition from natural resources based to knowledge and innovation led economy in many AU members States is hampered by a number of challenges and these include the following:

- **Difficulty to link STI to poverty reduction, job creation, sustainable livelihoods and improved well-being of citizens.**

Africa faces the challenge of how to build capacity and competencies to innovate? As countries engage in knowledge intensive activities, how will Africa expand its knowledge? Understanding and measuring the contributions of STI to the economy will allow for prudent policy formulation and a research agenda that will address economic and social challenges.

- **Limited capacity of national stakeholders to sustain an adequate national system of innovation (NIS).**

The low levels of awareness by various stakeholders on the significance of STI and related measurements shall be attended to. The number of key players to transform and sustain change and the national production system driven by S&T and Innovation requires to be attended to. Data produced by countries through ASTII show that the number of R&D personnel is only high in the Government sector. The reason could be because of state owned research centres and laboratories. Business firms and private non-for-profit organisations (PNPs) should also participate effectively and collectively to transform people wellness. ASTII surveys data reveals that business enterprises in Africa are not much involved in spending on R&D as is expected in an improved national innovation system (NIS).

- **Lack of science and technology desks in more than half of the 8 regional economic communities**

Very low participation of Regional Economic Communities (RECs) in innovation and scientific activities and in monitoring implementation of commitments to STI by member States

- **Availability of knowledgeable human capital familiar with STI measurement**

In the course of implementing ASTII, It has been observed that there is scarcity of national experts to compile and analyse STI statistics in most of the countries on the continent. This situation is exacerbated by natural mobility of staff through promotion, retirement and migration and to low motivation. As a result there is no critical mass of expertise in government and mainly in ministries responsible for S&T to effectively influence policy making processes based on evidence. This scenario is hampering efforts to demonstrate the link between national S&T and innovation progress with socio-economic growth or lack, thereof.

- **Limited resourcing of the responsible bodies at national level to conduct and analyse data from R & D and Innovation surveys.**



## POLICY RECOMMENDATIONS

### 1) Involvement of business sector in the national innovation system

- Formulate policies which allow incentives to firms investing more in R&D and Innovation activities;
- Encourage innovators and the informal sector to bring scientific knowledge to their populations through discoveries;

#### Box 1. Success Stories

**KENYA:** Over the implementation period of ASTII, Kenya has increased its national target for R&D expenditure as a percentage of GDP to 2% according to the newly adopted National STI Policy. This is a substantial increase given that in 2010 Kenya's actual R&D expenditure as a percentage of GDP was 0.48% (AIO, 2010). Margaret Kamar, Kenya's minister for higher education, science and technology noted that "It is a big victory for STI when the government approves not just what we had asked for — one per cent — but raised it to two per cent [of GDP],"

([www.scidev.net/global/policy/news/kenya-poised-for-major-science-commitment.html](http://www.scidev.net/global/policy/news/kenya-poised-for-major-science-commitment.html)).

**NIGERIA:** The Government has extensively used the results in the African Innovation Outlook report to review the country's STI Policy in 2012. Nigeria noted among other things that its R&D intensity (GERD/GDP) of 0.2 per cent was too low to drive sustainable development and a far cry from African target of 1.0 per cent. Based on this information the new STI Policy of Nigeria is trying to improve its budgetary allocation to STI, establishing a special fund for R&D called the National Research and Innovation Fund (NRIF) and a Venture Capital has also been launched. Nigeria has also taken steps to increase its human capital development by addressing the admission ratios in favour of Science, Engineering and Technology (SET) and by establishing nine new universities for S&T.

**TANZANIA:** In addition to the standard ASTII questionnaires, Tanzania extended the survey to assess the state of laboratories and scientific equipment in the country. Based on evidence from this survey, the government has since allocated a budget for the rehabilitation of laboratories and equipment, a move that has resulted in improvement in R&D infrastructure in public institutions in the country.

### 2) Improve the work and outreach at the nation, regional and continental levels of the ASTII initiative

- Enhance capacity development of data collection, analysis and use at the national, regional and continental levels;
- Expand the ASTII research activities to develop STI measurements that best inform and meet Africa's unique development needs;
- Link STI related indicators to the work performed by Africa's peer review mechanism (APRM), a peer evaluation process to assess the stage of in-country governance mechanisms;
- National Parliaments and the Pan-African Parliament should be actively involved in the process of enhancing the measurement of STI for evidence-based policy formulation and review in member countries.

### 3) Improve and sustain human capital development in the field of R&D and Innovation and related policies towards better national innovation system

- Motivate a considerable percentage of youth to pursue their studies and careers in fields of science and technology with a very limited skilled human capital;
- Strengthen the capacity of AU member States through in-country trainings and training within government

ministries on evidence-based policy making to generate a critical mass of STI experts in Africa. This is also important to mitigate the natural mobility of staff through promotion, retirement and migration as well as to improve the quality and sustain the production of quality data.

- Put in place policies and strategies to motivate business enterprises and civil society to participate in STI data collection and production of indicators;

#### 4) Sustain the monitoring and evaluation (M&E) process which will guide the achievement of development objectives, outcome for targeted impacts through STI

- Prioritize domestic resource mobilization for STI measurements in AU member States and RECs

### Annex 1: ASTII National Focal Points as at December, 2013

#	COUNTRY	NAME & POSITION (FOCAL PERSON)	ORGANISATION /INSTITUTION
01	ALGERIA	<b>Prof. Mokhtar Sellami:</b> Directeur Développement Technologique et Innovation Direction Général de la Recherche Scientifique et Développement Technologique	Ministère de l'Enseignement Supérieur et Recherche Scientifique
02	ANGOLA	<b>Dr Domingos da Silva Neto:</b> National Director, Scientific Research	Ministry of Science and Technology
03	BENIN	<b>Dr Houzangbe - Adote Sylvie :</b> Directeur national : Recherche Scientifique & Technologique	Ministère de l'Enseignement Supérieur et Recherche Scientifique (DNRST/MESRS)
04	BOTSWANA	<b>Ms. Lesego Motoma:</b> Director: Department of Research, Science and Technology	Ministry of Infrastructure, Science and Technology
05	BURKINA FASO	<b>Prof. Compaoré R.A. Maxime :</b> Secrétaire Général	Ministère de la Recherche Scientifique et de l'Innovation (MRSI)
06	BURUNDI	<b>Dr Tatien Masharabu:</b> Director-General: Science, Technology & Research	Ministry of Higher Education and Scientific Research
07	CAMEROON	<b>Dr Roger Noel Iroume:</b> Inspecteur Général #2	Ministère de la Recherche Scientifique et de l'Innovation (MINRESI)
08	CAPE VERDE	<b>Mr. Emanuel Borges</b>	Ministère de l'Enseignement Supérieur, Science et Innovation
09	CHAD	<b>Mr. Moussa Isseini:</b> Directeur de la Recherche Scientifique et Technique	Ministère de l'Enseignement Supérieur et de la Recherche Scientifique
10	CONGO	<b>Prof. Clobite Biona Bouka :</b> Conseiller du Ministre	Ministère de la Recherche Scientifique et Innovation Technologique
11	CONGO, Dem. Rep.	<b>Mr. Maurice Iyanza Mbako:</b> Directeur & Coordonnateur: Etudes et Planification	Secrétariat Général de la Recherche Scientifique Ministère de l'Enseignement Supérieur, Universitaire et Recherche Scientifique
12	EGYPT	<b>Prof. Dr. Maged Al-Sherbiny:</b> President of the National Academy of Science	Ministry of Science and Technology
13	ETHIOPIA	<b>Mr. Getachew Atintie</b>	Ministry of Science and Technology
14	EQUATORIAL GUINEA	<b>Dr Ondo Mba Teodoro:</b> Dcteur Général	Ministère de l'Education & Recherche Scientifique
15	GABON	<b>Dr Anasthasie Obono Mba,</b> épouse Essono : Directeur de la planification	Ministère de l'Education Nationale, de l'Enseignement Supérieur, de l'Enseignement Technique et de la Formation Professionnelle,
16	GHANA	<b>Dr. Emmanuel K. Tetteh:</b> Research Scientist	Science and Technology Policy Research Institute (STEPRI/CSIR)
17	KENYA	<b>Mr. Richard Mavisi Liahona:</b> Assistant-Director, Directorate of Research Management and Development	Ministry of Education, Science and Technology
18	LESOTHO	<b>Mr. Lefa Thamae:</b> Director, Science & Technology	Ministry of Communications, Science & Technology

#	COUNTRY	NAME & POSITION (FOCAL PERSON)	ORGANISATION /INSTITUTION
19	LIBERIA	<b>Mrs. Sangay Faellen:</b> Director, Science and Technology	Ministry of Education
20	MALAWI	<b>Mr. Patrick Mphadzula:</b> Acting Director, Science and Technology	Ministry of Education, Science and Technology
21	MALI	<b>Prof. Mohamed Dicko:</b> Chef de Division, Recherche scientifique	Centre National de la Recherche Scientifique et Technologique (CNRST)
22	MAURITIUS	<b>Mr Dharsing Pothegadoo:</b> Statistician	Statistics Mauritius
23	MOZAMBIQUE	<b>Mr. Mety Oreste Gondola:</b> Deputy National Director , Directorate of Planning, Statistics and Cooperation	Ministry of Science and Technology
24	NAMIBIA	<b>Mr. Alfred Adriaan van Kent :</b> Director, National Research, Science, Technology & Innovation	Ministry of Education
25	NIGER	<b>Dr Hassirou Mouhamadou :</b> Directeur de la Recherche Scientifique (MEMS/RS)	Ministère des Enseignements Moyen et Supérieur et de la Recherche Scientifique
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