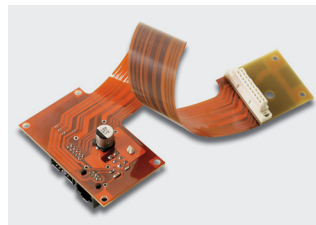
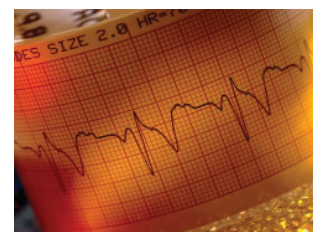
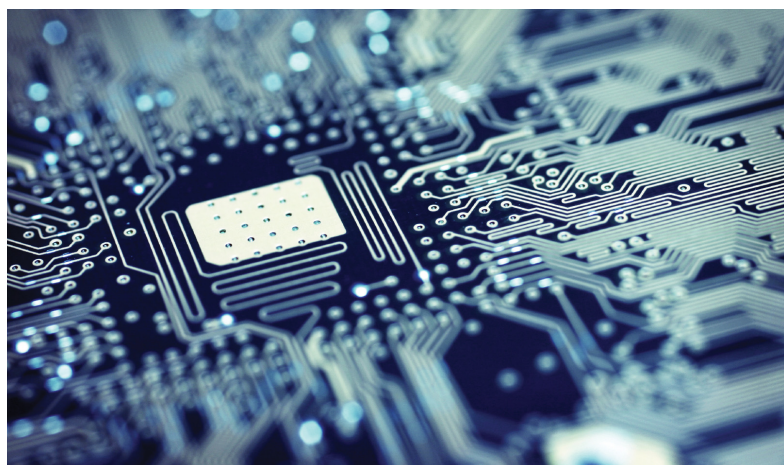


# Revitalising Science, Engineering and Technology Research & Deployment for Sustainable Development in Africa

## ACTION PLAN PRODUCED BY PARTICIPANTS AT

The 3rd Conference of Vice-Chancellors, Provosts and Deans of Science,  
Engineering and Technology  
(COVIDSET 2009)

Kampala, Uganda, 23-25 November 2009



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Published in 2010 by  
United Nations Educational, Scientific and Cultural Organisation  
Regional Bureau for Science and Technology in Africa  
P. O. Box 30592  
Nairobi, Kenya

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# List of Abbreviations

ANSTI	African Network of Scientific and Technological Institutions
COVIDSET 2005	First African Regional Conference of Vice Chancellors, Provosts and Deans of Science, Engineering and Technology
COVIDSET 2007	Second African Regional Conference of Vice Chancellors, Provosts and Deans of Science, Engineering and Technology
COVIDSET 2009	Third African Regional Conference of Vice Chancellors, Provosts and Deans of Science, Engineering and Technology
EAC	East African Community
ECOWAS	Economic Community Of West African States
ICT	Information Communication and Technology
NEPAD	New Partnership for African Development
R&D	Research and Development
R&Dep	Research and Deployment
S&T	Science and Technology
SET	Science, Engineering and Technology
SETI	Science, Engineering, Technology and Innovation
SETR	Science, Engineering, Technology and Research
SSA	Sub-Saharan Africa
UNESCO	United Nations Educational Scientific and Cultural Organisation
IP	Intellectual Property
MDGs	Millennium Development Goals
GDP	Gross Domestic Product

# Acknowledgments

Each year since inception, the COVIDSET series has continued to receive support from individuals, organizations and institutions in various ways to the success of the conferences and preparation of this outcome document. We are particularly grateful to the Directorate of International Cooperation of the Ministry of Foreign Affairs of the Government of Netherlands, The Carnegie Corporation and the International Development Research Centre (IDRC) who provided core support for the conference. The Network also received a grant from the German Academic Exchange (DAAD) to support the alumni of its fellowship programme. Being a project of UNESCO, ANSTI has always received financial support from the latter. The Network would also like to acknowledge the contribution of the International Council for Science (ICSU) who partnered with ANSTI to organize the conference.

The ANSTI Secretariat organized the meeting in collaboration with members of the international and local organizing committee. The network is very grateful to all the members of the committees especially staff of Makerere and Busitema Universities whose invaluable service made all the difference.

Finally, ANSTI would like to express its sincere gratitude to Dr. Elijah Omwenga, Director of the ICT Centre of the University of Nairobi, for serving as rapporteur-general in the COVIDSET 2009 and for compiling this report and to Dr Peggy Oti-Boateng, Director, Technology Consultancy Centre, Kwame Nkrumah University of Science and Technology, Kumasi, Ghana for reviewing the report.

# Preface

This report summarises the outcome of the conference on Revitalising Science, Engineering and Technology Research and Deployment for Sustainable Development in Africa from the 23-25 November 2009 in Kampala, Uganda. It was the third in a series after the first one in Accra, Ghana in 2005 followed by the second at Tshwane University of Technology in Pretoria, South Africa in 2007. Leaders who included Vice-Chancellors, Deans of Faculties of Science, Engineering and Technology and heads of academic departments from several African universities participated in the three-day event that was officially opened by the Prime Minister of Uganda Professor Apollo Robin Nsibambi. In a speech read on his behalf by the Minister for Higher Education, the Prime Minister implored the participants to develop appropriate frameworks and strategies for attracting highly trained scientists; for sharing scientific outputs, experiences and best practice and; for developing centres of excellence in science, technology and engineering.

Twenty three scientific papers were presented either at a plenary or at the parallel technical session. Four captivating cross-cutting addresses were also given by UNESCO/ANSTI leadership who graced the occasion. Participants shared their experiences and audits of achievements, challenges and provided evidence-based way-forward proposals. As has been the case since the inception of this series of highly successful conferences, two hundred university leaders made up of Vice Chancellors, Deans, Directors and Senior Administrator participated in this forum. Other participants were stakeholders from international donor community and agency representatives involved in Higher Education and the promotion of Science and Technology training in Africa.



Through these presentations and the parallel group discussions on the four sub-themes of harnessing partnerships for strengthening R&D and deployment; policy issues; cases studies on strategies of deployment; and investment options available, the conference adequately addressed the overall theme of the workshop and we are confident that the outcomes will form a solid reference document for policy makers, university administrators, donors and partners in higher education sector in Africa. We note that there are issues that have persisted throughout the COVIDSET series and these are highlighted within the action plan of this report for ease of reference. The report further aggregates the issues identified into six action points that require regional intervention with international support.

We hope that this report will find its way through higher implementation echelons among policy makers at institutional, national, regional and international donor agency circles.

Joseph G. M. Massaquoi  
Director, UNESCO Regional Bureau for Science and Technology in Africa  
Nairobi, Kenya.

February 2010

# 1.0: Introduction

Science, engineering, technology and innovation (SETI) are crucial for achieving sustainable development, poverty reduction and ultimately peace. In countries where science and technological innovations and advances have been pursued, these have yielded economic benefits and unique opportunities to meet basic human needs such as food, water, shelter, health, poverty reduction, environmental protection and improvement in quality of life. African countries abound in rich human capital and natural resource capabilities to make science technology and innovation work for the poor and enhance sustainable social and economic development. However, the continent is faced with many challenges of poverty, disease, and early death – all of which are indicators of underdevelopment. One of the main problems is a weak linkage between application of science, engineering and technological innovations and operational policy framework within which to harness these potentials.

Realising the importance of SET as a critical tool for development, several high-level forums such as the Congress of African Scientists and Policy-makers (CASP) in 2007 by African Union Summit of Heads of States and Governments, the Millennium Development Goals (MDGs), the World Summit on Sustainable Development (WSSD), 2002, and the Blair Commission Report for Africa, acknowledged the need to strengthen science technology and innovation and outlined strategies and targets that will re-position Africa in the world economy. . UNESCO, through the African Network of Scientific and Technological Institutions (ANSTI) took up the responsibility in organising all stakeholders in Africa and the Diaspora to harness the abundant research and development, technological and innovation capabilities on the continent for sustainable socio-economic and industrial development.

Universities and research institutions have a catalytic role in advancing this course. This can be through effective teaching and training of high calibre human resource capacity and capability in R&D and deployment which can see opportunities, take them, nurture them, grow and invest them for sustainable development.

In 2005, the African Network of Scientific and Technological Institutions (ANSTI), in collaboration with the Kwame Nkrumah University of Science and Technology (KNUST) and the UNESCO Regional Office for Science and Technology in Africa, organised the first regional conference of Vice-Chancellors, Deans of Science, Engineering and Technology (COVIDSET) in Accra, Ghana to deliberate on these issues and chart a way forward. A similar forum was organised in Pretoria South Africa to continue the discussion and evaluate actions taken since Accra COVIDSET and set new targets. With the organisation of this third edition of the COVIDSET, the ANSTI network is reaffirming its commitment in making these forums of African leaders, responsible for university training and research, an important and regular platform for exchange of ideas, capacity-building and design of concrete actions to improve the impact of high-level training and research on Africa's development.

The theme for COVIDSET, 2009 builds on the logic of the first two previous conferences, which were held on the issues of education, especially the 'state of science and technology training institutions' in COVIDSET 2005 and 'science and engineering education for sustainable development', COVIDSET 2007. The aim of COVIDSET 2009 was to look at the issue of science and technology research and its deployment to benefit society. Scholars widely acknowledged that although the contribution of science and technology research in accelerating development in most advanced and emerging economies is important, such contribution can only come about when the

outcomes of research are successfully deployed to serve development needs. Africa, unfortunately has limited tangible evidence linking the role of research to its development, because of the relatively small part of technology related activities in its GDP.

Issues of inadequate or lack of policy framework, regulatory barriers or uncertainties and unrealistic strategies are among the many challenges of the Science, Engineering, Technology and Research (SETR) sector in Africa. While issues of policy and regulatory gaps often relate to the existence of political will and enabling environment, those for designing effective strategies require more holistic technical capacity and capability development approach which are weak on the continent. And this is where Universities and Institutions of Higher Learning must assert themselves and exert their influence. The role of universities and research institutions in this process cannot be over emphasised especially when it comes to providing policy guidelines on SETI, providing an enabling work environment, raising profile of SETI and promoting the pertinence of research to the African society.

Achieving sustainable development and becoming visible players in the global economy, revitalising S&T research and emphasising deployment of scientific and technological innovations are the most promising paths for African economies to attain global competitiveness. Several examples of successful policies on regulations and strategies for undertaking vibrant research and efficient deployment of products to impact African economies abound, and such cases need to be shared and lessons learnt documented to enhance the use of SETI for sustainable development. COVIDSET, 2009, provided the forum for deliberating on these key issues, identifying challenging, making recommendations for overcoming them and developing an action plan for the way forward. Discussions were based on the following four sub-themes:

- Harnessing partnerships for strengthening R&D and deployment in Africa
- Science, Engineering and Technology R&D and Deployment Strategies with special emphasis on case studies and best practice
- Issues in R&D and deployment policy and implementation and
- Investment in R&D and deployment in Africa.

This report represents a brief description of the key issues discussed giving examples of what has worked, what is working and what needs to work and what actions and strategies need to be taken to make Africa visible in this new economic paradigm shift. Participants recommended the need to raise the profile of university managers responsible for research & extension and industry-academia collaborations and partnerships in order to accelerate development of policy frameworks for SETR and to develop impact performance indicators to assess investments and deployment strategies. For ease of reference, this report is in three parts. Chapter 1 sets the pace and gives the background to the COVIDSET series and in particular the 2009 COVIDSET theme and sub-themes. Chapter 2 discusses the problems identified within the context of the four sub-themes, while Chapter 3 looks at the proposed actions and their objectives. A summary matrix of the action plan with strategies for implementation is given at the end of the report in an appendix.

## 2.0: The Problems Identified

Reference to the outcomes of COVIDSET 2005, Accra Ghana and COVIDSET 2007, Johannesburg, South Africa provided the theme for COVIDSET, 2009. The Ghana conference being the first in the series and taking place immediately after the publication of a report on 'State of science and technology training institutions in Africa' was, more of an audit focusing on the analysis of the state of S&T training and research institutions and their effectiveness in responding to the socio-economic development of Africa. The Johannesburg conference, in 2007 on the other hand, assessed the relevance of science, engineering and technology training in meeting the developmental challenges of Africa.

The 2005 COVIDSET report identified a number of problems that continue to bedevil teaching and management of science and engineering courses and conduct of research in institutions of higher learning in Africa. In particular, quality of staff, outdated curricula, low funding, inadequate laboratory and library facilities and ICT services were some of the challenges faced by many Universities. Nine priority action plans were developed for regional co-operation for revitalizing S&T training institutions.

The Revitalizing Science and Technology Training Institutions in Africa action plan recommended strategies for regional exchange of information and good practices, staff exchange, staff training and retraining to enhance human resource capacity and to gain skills for fighting against HIV/AIDS. Although the theme for COVIDSET 2007 was on the relevance of SET training to development in Africa, the problems identified were similar to those of 2005, but the strategies and specific objectives were different in addressing those problems.

One of the key strategies was the involvement of stakeholders in curricula reviews to make university courses more relevant to industries and promote private sector –university linkages.

COVIDSET 2009 is a sequel to previous ones focusing on revitalizing science, engineering and technology research and deployment for sustainable development in Africa. For easy reference and cross checking of progress made since 2005, the same framework and format for identifying key issues and problems and the respective proposed actions for the four thematic areas was used.

## 2.1 Harnessing Partnerships for Strengthening R&D & Deployment in Africa

Resources for scientific, engineering and technological innovations are expensive and limited. No one institution has all the human and resource capital for research, development and transfer of innovations to the market, so it prudent to harness partnership for strengthening R&D and deployment, especially in Africa where most of these researches are donor driven. Africa's efforts to achieve sustainable development through harnessing partnership of available technologies have been hindered by a myriad of problems which is shared by many institutions of research and higher learning. Eleven problems were identified and these are grouped into five major categories. They include i) Policy on R&D at institutional and national levels; ii).University-industry relationships in terms of coordination, focus, bi-partisan roles and participation; iii) Deployment mechanisms; iv) Financial support and v) Monitoring and evaluation of R&D investments. Although this is a cross cutting theme, specific problems under this section are taken in turn and discussed and strategies for dealing with these are recommended.

## 2.1.1 Policy on R&D at National & Institutional Levels

Clear policies on research and development and their role in national and institutional development are essential for harnessing partnerships for sustainable social, economic and industrial development and maximising investment. However, many countries and institutions do not have well co-ordinated policy framework with strategies and targets to enhance institutional or national competitiveness. The absence or limited availability of these was seen as a major problem in harnessing partnership for strengthening R&D and its deployment in Africa and participants identified some specific issues:

### a) Information Vacuum and Poor Response

Many universities and research institutions have carried out a number of researches with marketable findings but these have remained on the shelves of academics or in libraries. Lack of repositories with information on scientists and professionals working in different areas of research was identified as an impediment to effective engagement.

Information on specialised facilities required for high-end research is also often lacking hence the poor response to available opportunities for collaborative research. Participants recommended sharing of information and strengthening respective research areas as well as engaging Ministries of Education to fund the creation of national repositories of research works and facilities.

### b) Inadequate Coordination of Activities

There is inadequate sharing of information among many African institutions either in country or elsewhere within the continent. This often leads to duplication of effort with scarce resources that should be consolidated for greater impact.



Participants identified inadequate coordination of activities as a major source to this problem and recommended development of mechanisms that will enhance synergy and consolidate efforts.

### c) Lack of Policies

Due to absence or uncoordinated national or institutional policies on R&D investment many research activities are either done in isolation or without national focus. Two problems associated with this were identified, namely; policies on continuity of research and collaboration.

**Continuity of research:** Many institutions do not have policies to ensure continuity of research initiatives when the leadership changes. This abruptly ends existing research initiatives and collaborations.

**Collaboration:** There is lack of institutional and government policies to facilitate collaboration between academia and industry.

One strategy proposed to deal with the above is to establish within each university, a senior position in charge of research, extension and policy to coordinate, disseminate research findings and formulate innovative R&D policies.

### d) Evaluation of Performance of Centres of Excellence

Many centres of excellence continue to be established in response to demands for requisite state-of-the-art infrastructure to conduct quality research. There is however, a growing concern on duplication tendencies due to inadequate information available on these Centres. Moreover, the performance of some of these institutions is not clear as there are no indicators or existing evaluation mechanisms to justify continued investment in them.

Participants were of the view that performance indicators should be developed to monitor, and evaluate the effectiveness of these Centres of Excellence in responding to the objectives for which they were developed.

## 2.1.2 University-Industry Partnership

It was noted by many that there was an absence or poor established partnership between university and industry resulting in some university curricula being irrelevant to industry and university staff lack the confidence to participate in effective university-industry dialogues. Participants believe that with relevant curricula, confidence and participation and clear objectives on both sides can bring about effective bi-partisan relationships. These problems were discussed in detail and strategies to overcome them were suggested.

### a) Relevance of curricula

Lack of coordinated input from industry into curriculum development was identified as a source of disagreement in terms of perceived relevance to either party. Industry therefore tends to find the curricula not serving its needs to the development of products, process or management. One strategy to deal with this problem is to establish curricula advisory committees with industry involvement.

### b) Lack of Confidence

The conference participants noted with concern that some African universities lack the confidence to support high-impact award-winning proposals that focus on solving industrial problems. This is mainly due to the need to aim at getting something rather than losing everything. To solve this problem, there is need to develop and promote proposals that are relevant to the themes of the donors and industry in order to increase chances of success.

### c) Participation in Forums such as COVIDSET

Participation in forums such as COVIDSET is a first step towards developing a convergence of mind and finding solutions to problems that affect the African society. It was observed that industry leaders and heads of government agencies were not effectively represented in COVIDSET meetings. Lack of participation creates gaps in terms of involvement in tackling common SETI issues. Participants recommended close cooperation with stakeholders in developing the COVIDSET themes. This will encourage them to attend and use the forum to explain their SETI goals, objectives and aspirations.

### d) Inadequate Industry Focus

Several factors affect investment options that industry players engage in. Short term rather high-impact projects sometimes gain prominence due to inappropriate focus and universities have little influence on shaping the direction. To deal with this challenge, the participants recommended greater input from industry towards the development of curriculum focusing on long term investment plans in common areas of interest.

## 2.1.3 Deployment Mechanisms

Coupled with the absence of appropriate R&D policies, deployment mechanisms of research outputs become not only a challenge to implement but also an impediment to the efforts of translating research outputs into useful products for the benefit of communities.

Research and development are often carried out without a dissemination plan or an identified target recipient. To deal with this issue, there is need to develop policies on deployment of research outputs, listing targets or markets.

## 2.1.4 Financial Support

Inadequate funding has been identified as one of the key challenges in R&D and this is closely linked to partnership, which in general, requires a contribution to a purpose in the form of space, time and capital. In other words it is a contributory approach in terms of human and other material resources and this was identified as a major handicap in fostering long term partnerships. A strategy for resolving this shortcoming is to emphasise the expansion of the revenue base while at the same time strengthening existing partnerships.

## 2.1.5 Monitoring and Evaluation of R&D Investment

One important ingredient in R&D is monitoring and evaluation (M&E) but it is often over looked in this and other processes. Continuous monitoring does not only give early warnings but offers the opportunity to correct problems and make adjustments earlier than later and develop new strategies and actions.

Evaluation is an essential tool for assessing progress of work, profit or cost benefit analysis over time, space and resources. Monitoring and evaluation of R&D investment is important for analysing the effectiveness of the R&D in meeting the goals and objectives of an investment and to chart new direction or develop new products and processes.

One of the main problems identified was lack of vigilance, regular monitoring and evaluation of R&D investment. Strategy for overcoming this is to develop bench marks and performance indicators for each process in R&D development, transfer and management.

## 2.2 R&D and Deployment Policy Issues

Issues on R&D and deployment policy can be broadly analysed under levels; institutional and national policies. Each of the two categories of problems are discussed as follows:

### Institutional Level Policy Issues

#### Baseline Survey Data

Baseline data is essential in any development process. Not only does it pool information together, but creates new knowledge base for policy planning, designing, implementing, monitoring and evaluation. In spite of this, the absence or limited availability of baseline data for policy formulation on R&D deployment was identified as a major setback. Specifically, problems identified were lack of baseline survey data to inform decision making processes, lack of policy development guidelines on various issues, lack of data to support specific actions, and general deficiency of performance and quality assurance parameters to assess progress and impact of output. Participants suggested several interventions and recommended that ANSTI takes the initiative to lead in this process. This includes encouraging universities and research institutions to collect essential baseline data, share this information and develop repositories on SETI and R&D results.

#### Promotion and Incentives for Innovation

It was recognised that lack of appropriate incentives and protection of innovation affect motivation to engage in R&D activities. Copyright and patent infringement issues elicit emotions and yet there are no clear strategies in place to deal with them at institutional level.

Participant recommended the establishment of promotion criteria to make the process more transparent. On the question of innovation and incentives, a one-stop-office to handle copyright and patent matters was recommended as an invaluable service at close reach to reduce unnecessary frustrations among staff.

## Relevance of R&D Outcomes to Societal Needs

Participants observed that many research and development works are not targeted to solving specific basic human needs. The onus is on institutions, especially since tax payers' money from either national or international funds are used, to develop projects that address basic needs for sustainable development. It is therefore important to access published data and information to inform research project priorities.

### Funding Constraints:

There is lack of adequate funding for R&D in general, but especially for basic research whose focus and relevance may be beyond national or institutional interest. Funding of such research was seen as a problem that should be addressed through expansion of revenue sources.

## National Level Issues

### National S&T Policies

National STI policies are required to spearhead innovation and research at all levels. Lack of information on the existence of policies and their quality, relevance and impact was identified as an impediment to SET developments. In order to tackle this problem, participants recommended strategies that will create forums where issues on SET training and policy formulation can be discussed.

## Low Prominence of S&T

Professional bodies such as Institution of Engineers, Association of Scientists etc were identified as important institutions that can facilitate the implementation of S&T policies and enhance their visibility, relevance and impact. Participants recommended more involvement of such institutions in these activities and should assist in formulating mechanisms that promote the visibility and impact of SETI.

## 2.3 SET R&D and Deployment Strategies: Case Studies

The changing nature of science and engineering with a steady stream of technological advances and innovations and continuous restructuring of industries are paramount in increasing the global competitiveness of developed economies. And higher education sectors in these countries have taken advantage of these new ways of operation by providing the needed SET innovations for these economies. Underdeveloped or Developing economies such as Africa however trail behind. There are limited comparative performance indicators such as science, technological innovations and industry, R&D budget, productivity and patents, and investment and policy initiatives in assessing competitiveness and economic growth. There are indeed, many problems but two areas of concern were identified for attention: the need to commercialise research findings and innovations for greater impact on society and the need to develop strategic plan for R&D within Africa.

## Commercialization of Research Findings & Innovations

Commercialisation of R&D results is a complete process and requires synergy between all actors in or outside an innovative system.

These actors include knowledge producers and users, policy makers at institutional and national levels, industries, financial institutions, entrepreneurs and markets. The absence or lack of effective linkages between all or some of these stakeholders can impede transfer or commercialisation of research findings and innovations. The following specific problems were identified and strategies developed to overcome them.

### Lack of Government Commitment to S&T

S&T must be supported at all levels. Lack of commitment to science and technology development by governments was identified as a problem that needs to be tackled through increased involvement at the political level.

### Lack of appropriate incubation processes

Commercialisation of research output is a process which may take time to grow. Incubation structures are required to enhance the process and hence realise greater impact.

### Inadequate assessments of industrial needs

S&T products should meet industrial needs for commercialisation to be viable. The assessment of the situation was found to be inadequate and one strategy proposed to correct this is to gain a deeper and more objective understanding of the needs of industry.

### Inadequate funding by industries

Commercialisation of research findings and innovation requires input from industry in terms of resources and partnerships. This is lacking and tackling the problem requires a more proactive role from institutions and governments. An allocation of a 1% or more national budget to S&T research and development from government and industry was proposed.



## SET Strategic Planning within Africa

As indicated above, SET are primary forces that are shaping the world today, in particular, the effect of modern information technology on production, business processes, values, health, consumer preferences, etc, has changed the way of conducting R&D. This new paradigm shift requires new strategies and plans to be effective in this global economy, and Africa must respond to this change and take advantage of this new trend. Analysis of some of the challenges to overcome and new strategies and plans to be developed are:

### Communication and Transparency between African Universities

Higher education opportunities have expanded in recent times. However that expansion has not matched cooperation among universities to help foster better communication and reduce duplication of programmes and research in the region. Participants proposed the need to strengthen respective strategic areas defined by such factors as environment, tradition and history.

### Records and Follow-up on Research Findings

Proper records on research findings help identify key areas of emphasis. Lack of such records in most institutions makes it difficult to develop strategic plans in SET. Investing more on information systems to enhance good records keeping culture was emphasised as a viable strategy to help solve the problem.

### Involvement of Stakeholders

Implementation of strategic objectives in SET demands involvement of stakeholders. However this was found to be inadequate and the conference proposed the need to devise mechanisms that will enhance communication among stakeholders in areas of active research and other possible common interest.

## Consistency in Government Policy on SET

Policy on SET should be understood in similar manner at all levels of government. However, inconsistencies do arise and pose challenges of interpretation and application. In this respect, the conference recommended regular reviews on government policies on SET in order to align them with changing world trends, existing situations and other related policies.

## 2.4 Investment in R&D and Deployment in Africa

With proliferation of options available in terms of access to new technologies and innovations, investment facilities, and industries, Africa will have to prioritise its R&D to take advantage of these new trends in the global economy.

There are, however, many challenges which seem to retard progress investment in R&D deployment in Africa and can be grouped into two categories. There are those which are internal to the institutions while the others mainly require external intervention.

### Internal Investment Challenges

#### High quality R&D products

Markets the world over detect product, price and standard. R&D products should meet market prospects in terms of presentation, affordability and quality. This expectation puts pressure on the institutions to invest more at the research and production phases and set up quality assurance systems and standards.

## Good Governance in Universities and SET Institutions

Good governance is a basic requirement for attracting prospective investors in R&D. It is an assurance to partners that their continued participation in institutional efforts in R&D is safe and will not collapse. Rewards and sanctions approach was proposed as an effective means of enforcing good governance practices in universities.

### Appropriate infrastructure

Good governance as mentioned above and infrastructure are both fundamental for effective R&D work in any institution. Appropriate ICT, laboratories, and even basic physical space infrastructure are perceived as major hindrances to effective R&D work and investments in most institutions. One main strategy is to upgrade facilities and create an enabling environment for both teaching and research to attract investment.

## External Investment Challenges

### Tax waiver

Investment in R&D is an expensive undertaking whose return on investments is long term with intangible benefits in some cases. Governments should be willing to grant tax waivers and provide grants to spur industries and other stakeholders' involvement in SET activities. There is therefore need to strengthen cases for tax waiver opportunities as a strategy towards realisation of this objective.

### Public Perception of R & D

Any form of investment is expected to yield positive results to improve the lives of the people. However, as noted above, there is need to develop appropriate mechanisms that will promote faster outputs from R&D investments

to reduce negative public perceptions.

## Diaspora involvement

It was observed that the experts in the Diaspora were neither committed nor engaged in R&D work and investment opportunities. There are many factors that contribute towards lack of enthusiasm by those serving abroad to come back to their home countries to contribute to national development. Poor infrastructure and governance issues seem to be major factors that hinder them and finding solutions to these concerns should be a priority. However, the conference proposed the need to promote collaborative research work using the Internet and other online systems as a more pragmatic option to achieving faster engagement.

## Lack of Planning on R&D and SET

There are several reports commissioned by ANSTI and various institutions on the status of S&T in our universities. Governments and stakeholders have not made use of these reports, recommendations and statistics to make long term plans for SET development. The conference observed that such reports should be presented to governments and at forums where they can be given positive consideration and support.

## 3.0: Proposed Actions & their Objectives

This chapter outlines the proposed actions and their objectives to the problems identified. A detailed matrix at the annex contains the strategies and expected outcome of these actions alongside their objectives. The proposed list of actions and objectives is to serve only as a guide for the university leadership, decision makers and development partners involved in science, engineering and technology and R&D deployment because of the varying peculiarities which may demand different strategies and actions. Key priority areas have also been highlighted as a guide for international organisations involved in regional activities to consider for implementation at that level.

### 3.1 Harnessing Partnerships for Strengthening R&D and Deployment in Africa

The proposed actions are structured according to the categories of the problems identified.

#### 3.1.1 Policies for R&D Investments

The actions in this category aim at reversing negative trends in R&D investments.

##### (a) Information Vacuum and poor response

**ACTION:** Institutions and regional research centres are to develop repositories with information on scientists and professionals working in different areas of research. This will include maintaining updated websites with information on research topics and names of PhDs and MSc students. The objective is to enhance the sharing of information on scientists working in different areas in order to enhance synergy.

**ACTION:** Institutions and regional research centres to develop repositories on information on specialized facilities. The objective is to enable sharing of facilities for high-end research and hence maximize utilization and reduce cost of doing research.

**ACTION:** University leaders should promptly respond to request for information. This will bridge the information gap that might exist on research activities that are going on in an institution.

### (b) Coordination of activities

The following actions are aimed at improving the coordination of cross cutting activities.

**ACTION:** Create a notice board where information on research activities can be posted and shared. The objective is to disseminate information on activities across coordination groups for ease of monitoring and evaluation.

**ACTION:** Motivate scientists to incorporate online registration into scientific databases for ANSTI and other donors and partners. This will ensure that research grants are accessible to scientists who are registered with ANSTI and also foster a fair distribution and coordination of the resources.

**ACTION:** Put in place a system to report the activities of every member institution in ANSTI. This will facilitate the documentation of information by ANSTI and empower her to collaboratively develop effective intervention programmes for SET.

**ACTION:** Deans and Directors of SET faculties of every member institution should provide ANSTI Secretariat with data/research profiles of every SET academic staff member within their institutions.

The objective is to develop a database of scientists, member institutions and other partner agencies and make this information available people sourcing for expertise at ANSTI.

**ACTION:** ANSTI Fellowship should only be tenable within Africa. The objective is to make savings on the cost of training overseas and provide more opportunities for African scientists to engage in SET activities.

### (c) Lack of Policies in R&D

**ACTION:** Develop good and dynamic policies on R&D. The objective is to harness and strengthen partnerships for deployment of R&D in Africa.

**ACTION:** Appoint senior university officers at the level of Deputy Vice Chancellor to facilitate development and implementation of policies and collaboration between industry and academia. The objective is to elevate and fast-track R&D activities within institutions. This will also give R&D the credence required.

### (d) Evaluation of Performance of Centres of Excellence

**ACTION:** Mandate ANSTI to carry out regular audit on prevailing status of the network of technological institutes. The objective is to evaluate performance and recommend appropriate interventions.

**ACTION:** Have regional centres of excellence that specialise in different fields within Africa. The objective is to concentrate resources for higher impact research output.

## 3.1.2 Industry-University Relationships

The actions for this category relate to relevance of curricula, confidence, participation and focus.

### (a) Relevance of curricula

**ACTION:** Mandate every institution to have a team of experts from industry that advise on curriculum. This can be achieved by forming advisory committees with industry involvement. The objective is to ensure that the needs of industry are captured within the curriculum. This will also ensure that curriculum and research agenda are responsive to industry needs.

**ACTION:** Involve industry in identifying research problems. This is to align and synchronise research with societal and industry needs.

### (b) Confidence among researchers

**ACTION:** Encourage academics to come up with grant-winning research proposals that are relevant to industry needs. This is to attract funding from donors and partners, which is often linked to industry and societal needs.

### (c) Participation in Forums such as COVIDSET

**ACTION:** Encourage industry leaders and heads of government agencies to participate in the COVIDSET conferences and have a session focusing on inputs from industry leaders and heads of government agencies.

The objective is to receive inputs and recommendations from government and industry and gain their support for ANSTI and member institutions on SET for Africa as well as develop synergy between these stakeholders.



## (d) Inadequate Industry Focus

**ACTION:** Influence the direction of investments of industry through interactions and participation in SET forums. This is to share perspective and goals on R&D and SET.

**ACTION:** Keep records of university alumni and involve them in identifying industry problems and establishing partnerships with industry. The objective is to encourage the alumni of various institutions to plough back into their alma mater with a more focused approach having had the experience in both places.

**ACTION:** Encourage academics to join professional societies in order to influence industry. This will provide a forum for SET practitioners to meet and discuss R&D issues at professional level.

### 3.1.3 Deployment Mechanisms

**ACTION:** Task universities to develop policies on R & D which will facilitate the translation of research outputs into products that are useful to the community. The objective is to have a positive presence within the implementation community in order to create reciprocity in the deployment process.

### 3.1.4 Financial support

**ACTION:** Foster partnerships with other donor agencies such as the European Union to get more funds. The objective is to explore common areas of interest in R&D in order to attract additional funds.

### 3.1.5 Monitoring and Evaluation

**ACTION:** Develop monitoring and Evaluation tools such as performance

indicators for actions and processes. The objective is to assess the performance of the actions in meeting the targets time and cost to avert waste and mediocrity.

## 3.2 R&D and Deployment Policy issues

Actions on R&D deployment policy are categorised at institutional and national levels.

### Institutional Level Issues

These include baseline data, promotion of incentives for innovation, relevance of R&D and Funding.

#### Baseline survey data

**ACTION 1:** ANSTI to develop a template to circulate among all member institutions collecting data on various issues. The objective is to create a database for reference for possible intervention and as well as fill in any missing gaps.

**ACTION 2:** ANSTI to develop a template to circulate among all member institutions collecting data on institutional policies on R&D. The objective is to share experiences and good practices among member institutions.

**ACTION 3:** Conduct status surveys to assess challenges and opportunities to support R&D. The objective is to ensure that only targeted activities are developed and implemented.

**ACTION 4:** Document lessons learnt at each stage of R&D deployment. The objective is to ensure that improvements are made at various stages of deployment. This will not only be useful to the respective institution but also to other member institution who may find such documentation useful.

**ACTION 5:** Develop impact performance indicators. The is to assess the extent of value for money in terms of investments on R&D.

**ACTION 6:** Develop quality assurance systems. The objective is to enforce high quality standard outcomes.

### Promotion and incentives to innovate

**ACTION:** Develop promotion criteria and create a scheme of service that has incentives and sanctions. The objective is to ensure objectivity in the promotion process.

**ACTION:** Establish copyright office to provide advice and support for patenting of products and inventions. The objective is to motivate staff to seek copyright for their works and inventions with minimum hassle.

### Relevance of R&D outcomes to Societal needs:

**ACTION:** Develop close working relationship with industry and other stakeholders. The objective is to develop well-informed and relevant proposals that target industry and societal needs.

### Funding Constraints:

**ACTION:** Engage other stakeholders and partners in developing R&D projects that target similar goals. The objective is create the 'need to participate' and reduce selfish tendencies.

## National level issues

### Review National S&T Policies

**ACTION:** ANSTI to conduct a study to assess the availability, quality, relevance and impact of national S&T policies.

The objective is to collect information to help develop interventions at various levels of S&T policy development.

### Prominence of S&T at national level

**ACTION:** Encourage professional bodies such as the Association of Engineers to take a more proactive role in linking S&T to national development and improvement of people's lives. The objective is to elicit the relevance of S&T to society and showcase its prominence.

## 3.3 SET R&D and Deployment Strategies: Case Studies

Two areas of concern were identified for attention: the need to commercialise research findings and innovations for greater impact to society and the need to develop strategic planning for R&D within Africa.

### Commercialization of research findings & Innovations

#### Commitment by government to S&T development

**ACTION:** Engage government in setting up science parks in strategic places, preferably near universities or research institutions. The objective is to create awareness and provide a focal point for synergy and of sharing facilities for various R&D and manufacturing projects. This will showcase the importance of S&T for national development.

#### Appropriate incubation processes

**ACTION:** Develop incubation structures and benchmarks within institutions and government. The objective is to make available frameworks for incubation processes.

## Assessments of industrial needs

**ACTION:** Carry out surveys/studies to assess the needs of industry. The objective is to develop programmes and projects that are relevant to industrial needs.

**ACTION:** Strengthen the link between universities and industry through visits to existing science parks. The objective is to create awareness of existing investments and strengthen them through the participation of industry.

## Funding by the industries and government

**ACTION:** Develop common programmes and projects that will attract interest from industry. The objective is to create opportunity for joint funding of projects.

**ACTION:** Engage governments in developing policies for S&T funding by industries and private sector. The objective is to institute mechanisms for collecting a 1% levy or more from industries and private sector towards the funding of S&T.

## SET Strategic Planning within Africa

Problems on strategic planning for SET in Africa relate to the following areas:

Communication and transparency between African universities resulting in duplication of programmes and research

**ACTION:** Institutions should strengthen strategic areas where they have comparative advantage such as environment, tradition and history. The objective is to reduce duplication of research efforts and academic programmes given that most of the institutions are founded on strategic areas of strength.

## Inventory on equipment and follow-up on research findings

**ACTION:** Establish institutional databases of equipment for S&T with details on age, usage and students benefits. The objective is to help identify resources available so as to develop strategic plans for SET and possibility of sharing the equipment within the region.

**ACTION:** Encourage institutions to develop databases for research findings and post them on their websites not only for their own visibility and impact but also as a means to sharing information and hence create regional synergy for research.

## Involvement of most stakeholders

**ACTION:** Identify strategic areas in which stakeholders can be involved in terms of co-funding for common projects. The objective is to develop a close working relationship with stakeholders and gain their support, input and finally funding of research programmes.

## Inconsistency in government policy on SET

**ACTION:** Institutions and ANSTI to organise forums with governments to build consensus on SET policy. The objective is to develop a clear understanding of respective governments' agendas in terms of developing SET

**ACTION:** Institutions to be more proactive and study government policies on SET with a view to submitting proposals to facilitate their harmonisation and improvement. The objective is to positively influence governments' policies on SET and make them more relevant to institutional goals and objectives.

## 3.4 Investment in R&D and Deployment in Africa

Actions for investment challenges for R&D deployment are discussed under two general categories. The first category include actions geared towards influencing more internal investment in R&D while the second category focuses on actions that will promote external investments.

### Internal Investment Challenges

#### Need for high quality R&D products

**ACTIONS:** Institutions should invest more at the research and production phases of product or process development. The objective is to ensure that affordable and high quality products are produced.

#### Good governance in universities and SET institutions

**ACTION:** ANSTI and donor agencies should link good governance to funding of projects. The objective is to ensure that funds given for research projects are put into good use and for the intended purposes.

#### Appropriate infrastructure

**ACTION:** Institutions should put in place policies and strategies for developing appropriate infrastructure for ICT, laboratories, and other basic physical space requirements. The objective is to provide an enabling environment for conducting high quality research.

### External Investment Challenges

#### Tax Incentives/ waiver by governments

**ACTION:** Identify SET and R&D areas that need tax rebates and/or waivers and

and recommend to government. The objective is to provide incentives and reduce cost of R&D investments.

### Public negative perception of R & D

**ACTION:** Where possible well tested R&D results should be promptly deployed. This is to shorten the period for making a return on investments and hence reduce negative public perceptions.

### Diaspora involvement

**ACTION:** Engage the experts in the Diaspora through short-term academic exchange visits. This is to enhance partnership between African institutions, staff and those in the Diaspora and create interest for possible areas of research and convergence.

### Effective planning of R&D and SET

**ACTION:** Governments and stakeholders should make use of various recommendations on the status of S&T in respective institutions for effective long term planning. The objective is to make productive use of reports, data and statistics emanating from SET institutions.



## 4.0: Priority Actions for Regional Cooperation and International support for Revitalising Science, Engineering and Technology Research and Deployment for Sustainable Development in Africa

In preceding chapters, participants identified several challenges that retard revitalisation of Science, Engineering and Technology and innovation research and development for sustainable development in Africa. From their rich experiences and expertise, strategies and actions were recommended for implementation at institutional and national levels. This section, however outlines six (6) key priority areas which can be implemented at regional or international levels. These action points will guide regional and international governments and donor agencies that are involved in supporting SET and R&D deployment in African institutions of higher learning.

### Information Vacuum and poor response

Inadequate databases with information on scientists and professionals working in different areas of research were identified as an impediment to effective engagement. Information on specialised facilities required for high-end research is also often lacking hence the poor response to available opportunities for collaborative research. The following four action points were recommended.

**ACTION:** Promote the creation of databases on information on scientists and professionals working in different areas of research in the region. This will include maintaining updated websites with information on active research that is going on. The objective of this action is to enable sharing of information on scientists working in different areas in order to enhance synergy and

opportunities for funding.

**ACTION:** Establish repositories on information on specialized facilities available in universities and regional research centres. This will enable sharing of facilities for high-end research to maximize their utilization and reduce cost of doing research.

**ACTION:** Encourage university leaders to promptly respond to requests for information on R&D activities in their institutions. This action aims at bridging the information gap that often exists on what research activities are going on in an institution.

## Lack of Policies on S&T and R&D

The issue of limited or unavailability of policies on S&T and R&D was identified as cross cutting theme at both institutional and government levels. The following actions were proposed to address this phenomenon.

**ACTION:** At the institutional level, it is recommended that senior university officers at the level of Deputy Vice Chancellor should be appointed to facilitate development and implementation of policies and collaboration between industry and academia. The objective is to give due recognition to the importance of R&D, develop a strong R&D culture as well as fast-track the deployment of R&D activities emanating from the institutions.

**ACTION:** Encourage institutions to be more proactive and study government policies on SET with a view to submitting proposals to facilitate their harmonisation and improvement. The objective is to positively influence governments' policies on SET and make them more relevant to institutional goals and objectives.

## Industry Focus

Quite often the priorities of industry are at variance with those of universities. This creates discordance in the development and deployment of R&D products and services to the society. The following actions were proposed to address this gap.

**ACTION:** Influence the allocation/direction of investments of industry through interactions and participation in SET forums. The objective is to develop shared perspective and goals on R&D and SET.

**ACTION:** Support the creation of database on university alumni, co-opt them in identifying industry problems and establish partnerships with industry. This action aims at encouraging the alumni to support their alma mater with a more focused approach, having themselves had the experience in both places.

**ACTION:** Encourage academics to join professional societies in order to influence industry. The objective of this action is to provide an opportunity for a common platform for SET practitioners to meet and discuss R&D issues at professional level.

## Deployment mechanism for SET Research

Coupled with lack of appropriate R&D policies in general, deployment mechanisms of research outputs become not only a challenge to implement but also an impediment to the efforts of translating research outputs into useful products for the benefit of communities. The following action was proposed to mitigate this challenge.

**ACTION:** Facilitate the capacity building of universities in the development of good policies with performance indicators and targets on R&D which will promote translation of research outputs into products that are useful to the community. The objective is to develop a positive presence within the implementation community in order to create reciprocity in the deployment process.

## Baseline Survey Data on R&D and Deployment Policies at Institutional Level

There is need for baseline data on SET and R&D to inform decision making processes at all levels. The participants recommended several interventions that ANSTI and other donor agencies may take the initiative to spearhead at regional level.

**ACTION 1:** Promote and adopt a template to collect data on various issues including status of policy on SET and R&D in member institutions. The objective is to develop a database on gaps and possible interventions. The action also aims creating a common interface for sharing experiences and best practise among member institutions.

**ACTION 2:** Promote the documentation of lessons learnt at each stage of R&D deployment. The objective is to ensure that progress is made at each stage of deployment and good practices are emulated in future. This will not only be useful to the respective institutions but also to other member institution who may find such documentation useful and build on the experiences of others without re-inventing the wheels.

**ACTION 3:** Conduct status surveys to assess challenges and opportunities for R&D initiatives. The objective is to ensure that only priority activities are developed and deployed.

**ACTION 4:** Promote the development of impact performance indicators. This objective aims at assessing the value of investments in R&D.

**ACTION 5:** Promote the development of quality assurance systems. The objective is to enforce quality outcomes of R&D investments and become more competitive.

## Inadequate funding

Funding is a problem that continues to impede R&D and SET activities in the region. Every effort should be made to consolidate initiatives geared towards supporting programmes and projects in SET. The following action points have been proposed for international support through partners and government interventions.

**ACTION:** Promote the development of programmes and projects that will attract interest from industry and the international community. The objective is to create room for joint funding of projects at international level.

**ACTION:** Engage governments to develop policies for S&T funding by industries and private sector. The objective is to institute mechanisms for a 1% or more commitment levy from industries and private sector towards S&T research and activities.

**ACTION:** Develop policies and strategies for funding appropriate infrastructure for ICT, laboratories, and other basic physical space requirements. The objective is to provide an environment for conducting high quality research that meets international standards.

## Monitoring and Evaluation

Monitoring and evaluation (M&E) is often overlooked in the design, planning, implementation often. Effects must be by made by all to develop capacity in monitoring and evaluation.

**ACTION:** Develop performance indicators for following progress and tracking any problems during all the stages of design, planning and implementation. The objective is to prevent failure and enhance implementation and maximize resources.

# Annex I

## OUTLINE OF THE ACTION PLAN

## ANNEX I: OUTLINE OF THE ACTION PLAN

### Sub-Theme 1: Harnessing Partnerships for Strengthening R&D and Deployment in Africa

Problems identified	Strategies to address the problem	Actions proposed	Objectives of such actions	Responsible actors	Expected outcomes
Information vacuum and poor response	Encourage information sharing including strengthening respective research areas	<p>Institutions and regional research centres to develop repositories with information on scientists &amp; professionals working in different areas of research.</p> <p>This will include maintaining and updating websites with information on research topics and names of PhDs and MSc students.</p>	To enable sharing of information on scientists working in different areas in order to enhance synergy	<ul style="list-style-type: none"> <li>- University Leaders</li> <li>- Researchers</li> </ul>	<ul style="list-style-type: none"> <li>- Information repositories</li> <li>- Enhanced communication</li> </ul>
Inadequate Coordination of Activities	Develop mechanisms to enhance synergy and consolidation and hence reduce duplication of effort	Create an online notice board where information about research activities can be posted & shared	To spread information about activities across coordination groups for ease of monitoring and evaluation	<ul style="list-style-type: none"> <li>-Universities</li> <li>-Researchers</li> </ul>	<ul style="list-style-type: none"> <li>-Reduction of duplication of research activities</li> <li>-More collaborative research</li> </ul>

\* Issues marked with this symbol were also identified as problem areas in the previous COVIDSET conference in 2007



## ANNEX I: OUTLINE OF THE ACTION PLAN

### Sub-Theme 1: Harnessing Partnerships for Strengthening R&D and Deployment in Africa

Problems identified	Strategies to address the problem	Actions proposed	Objectives of such actions	Responsible actors	Expected outcomes
Lack of Policies in R&D *	Encourage institutions to develop policies on R&D and also tie existence of policies to aspects of funding	Develop good policies on R&D to ensure continuity of research initiatives even upon change in leadership	To harness & strengthen partnerships for deployment of R&D in Africa.  To encourage collaboration between academia and industry	-Universities -Industry	-Policies developed -Enhanced collaboration between universities and industry
Lack of Evaluation of Performance of Centres of Excellence	Encourage centres of excellence to justify investments on their establishment	Mandate ANSTI to carry out regular audits on the current status of the network of technological institutions	To evaluate performance and recommend appropriate interventions	-Universities in partnership with ANSTI	-Status reports on performance
Inadequate relevance of curricula to industry needs *	Encourage input from industry to curriculum development processes	-Mandate every institution to have a team of experts from industry that collaborate on curriculum development  - Form advisory committees with industry involvement	To ensure that the needs of industry are captured within the curriculum. This will also ensure that curriculum & research agenda are responsive to industry needs	-Universities -Industry	Relevant curricula to industry needs

\* Issues marked with this symbol were also identified as problem areas in the previous COVIDSET conference in 2007

## ANNEX I: OUTLINE OF THE ACTION PLAN

### Sub-Theme 1: Harnessing Partnerships for Strengthening R&D and Deployment in Africa

Problems identified	Strategies to address the problem	Actions proposed	Objectives of such actions	Responsible actors	Expected outcomes
Lack of Confidence by researchers	Promote proposals that are relevant to the themes of the donors and industry in order to increase chances of success	Encourage academics to come up with grant-winning research proposals that are relevant to industry needs	To ensure that funding from donors & partners, which is quite often linked to industry and societal needs, is available	-Researchers	-Award-winning proposals
Low participation in Forums such as COVIDSET by governments and other agencies	Closely involve government agencies, industry and donors in the development of the themes for the COVIDSETS and encourage them to use the forum to explain their goals in SET	Involve industry leaders & heads of government agencies to participate in the COVIDSET conferences	To tap onto the perspectives of these leaders and gain their support towards the objectives of ANSTI and member institutions on SET for Africa	-Governments -Donors -ANSTI	-Increased participation
Lack of Industry Focus	Encourage input from industry towards the development of curricula and develop long term investment plans around the common areas of interest	Influence the direction of investments of industry through interactions and participation on SET forums.	To develop shared perspective and goals on R&D and SET	-Industry -Universities	-An more focused industry-university partnership

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## ANNEX I: OUTLINE OF THE ACTION PLAN

### Sub-Theme 1: Harnessing Partnerships for Strengthening R&D and Deployment in Africa

Problems identified	Strategies to address the problem	Actions proposed	Objectives of such actions	Responsible actors	Expected outcomes
Inadequate deployment mechanisms	Develop policies on deployment of research outputs	Task universities to have proper policies on R&D which will facilitate translation of research outputs into products that are useful to the community	To develop a positive presence within the implementation community in order to create reciprocity in the deployment process	-Universities	-Deployment policies
Inadequate Financial support	<ul style="list-style-type: none"> <li>-Strengthen partnerships with donors &amp; other agencies for financial support</li> <li>-ANSTI and universities redouble fundraising efforts</li> <li>-Encourage development of other sources of funding</li> </ul>	<ul style="list-style-type: none"> <li>-Foster partnerships with other donor agencies such as the European Union to get more funds</li> <li>-Lobby for increased government allocations to SET and R&amp;D</li> </ul>	<ul style="list-style-type: none"> <li>To explore common areas of interest in R&amp;D in order to attract additional funds</li> <li>-To improve funding to SET training and Research Deployment</li> </ul>	<ul style="list-style-type: none"> <li>-Universities</li> <li>-Governments</li> <li>-Industry</li> </ul>	-Improved financing of SET training and Research deployment activities
Monitoring and Evaluation	Encourage universities to develop M&E plans	Develop performance indicators	To prevent failures and monitor progress	Universities, ANSTI	M&E Plans developed

\* Issues marked with this symbol were also identified as problem areas in the previous COVIDSET conference in 2007

## Sub-Theme 2: R&D and Deployment Policy issues

Problems identified	Strategies to address the problem	Actions proposed	Objectives of such actions	Responsible actors	Expected outcomes
Lack of baseline survey data	Encourage universities & research institutions to share information & develop repositories on SET Research and deployment (SET R&D and Deployment) for reference	(i) ANSTI to develop a template to circulate to all member institutions for collecting data on various aspects	To develop a database on gaps for reference & possible intervention	-ANSTI -Universities	A database on SET activities & research deployment developed
		(ii) ANSTI to develop a template to circulate to all member institutions collecting data on institutional policies on SET R&Dep	To share experiences & best practise among members institutions	-ANSTI -Universities	Information on status of policy formulation on SET and Research Deployment
		(iii) Document lessons learnt at each stage of research deployment	To ensure that improvements are done on subsequent stages and cases of deployment in future	-Researchers -Universities	Improved deployment mechanisms
		(iv) Conduct status surveys to assess challenges and opportunities to support SET R&Dep	To ensure that only targeted activities are developed and implemented	-Universities -Regional donors -Industry	A more focused approach to development of research projects

\* Issues marked with this symbol were also identified as problem areas in the previous COVIDSET conference in 2007

## Sub-Theme 2: R&D and Deployment Policy issues

Problems identified	Strategies to address the problem	Actions proposed	Objectives of such actions	Responsible actors	Expected outcomes
		(v) Develop impact performance indicators	To assess the extent of value for money in terms of investments on R&D	-Universities -Donors -Governments	Better informed investment decisions
		(vi) Develop quality assurance systems	To enforce high quality outcomes	-Universities -Governments	Quality outcomes of research effort
Lack of promotion and incentives	Encourage staff to publish and meet promotion criteria set	Develop promotion criteria and create a scheme of service that has incentives and sanctions	To ensure objectivity in the promotion process	-Staff/researchers -Universities	-Promotion criteria -Motivated staff
Lack of relevance of SET to Societal needs *	Promote the use of published data and information on the needs of society	Develop close working relationship with industry and other stakeholders who carry out demographic and status studies	To develop well-informed proposals that target societal needs	-Universities in partnership with Industry and other agencies involved	-More relevant SET projects & outcomes

\* Issues marked with this symbol were also identified as problem areas in the previous COVIDSET conference in 2007

## Sub-Theme 2: R&D and Deployment Policy issues

Problems identified	Strategies to address the problem	Actions proposed	Objectives of such actions	Responsible actors	Expected outcomes
Low funding for basic research	Promote the impact and relevance of basic research to S&T in general	Engage other stakeholders and partners in developing R&D projects that target similar basic research goals	To create the 'need to participate' and reduce selfish interests	-Universities in collaboration with donors, industry and governments	Improved funding for basic research
Lack of National S&T Policies *	Promote forums for discussion of S&T training and capacity building in policy formulation issues	ANSTI to mount study to assess the status of national S&T policies including their quality, relevance and impact	To collect data to help develop interventions at various levels of developing S&T policies.	-ANSTI -Governments in partnership with Universities and Industry	National policies on S&T
Low prominence of S&T *	Develop mechanisms that will promote the visibility and impact of S&T in society	Encourage professional bodies such as association of Engineers to take a more proactive role in linking S&T to national development and improvement of people's lives	The objective is to bring out the relevance of S&T to society and hence raising its prominence	-Governments -Parliamentarians -Universities	S&T profile in society raised

\* Issues marked with this symbol were also identified as problem areas in the previous COVIDSET conference in 2007

### Sub-Theme 3: SET R&D and Deployment Strategies: Case Studies

Problems identified	Strategies to address the problem	Actions proposed	Objectives of such actions	Responsible actors	Expected outcomes
<b>(a) Commercialization of research findings and Innovations</b>					
Lack of Commitment by government to S&T *	Enhance visibility of S&T at the political level	Engage governments by setting up science parks in strategic places such as in parliament	To create awareness and hence an appreciation and commitment to S&T for national development	-Universities -Parliamentarians -Governments	Enhanced government commitment to S&T
Lack of appropriate incubation processes	Enhance development of incubation structures	Develop incubation structures & benchmarks within institutions and government	To make available frameworks for incubation processes	-Universities -Governments	Systems for incubation processes developed
Inadequate assessments of industrial needs	Develop a more objective understanding of the needs of industry	(i) Carry out surveys/studies to develop a more objective understanding of industrial needs	To develop programmes and projects that are more relevant to industrial needs	-Universities in partnership with industry	-More relevant projects to society
		(ii) Strengthen the link between universities and industry through visits to existing science parks	To create awareness of existing investments and strengthen them through the participation of industry	University in partnership with industry	Enhanced University-industry linkages

\* Issues marked with this symbol were also identified as problem areas in the previous COVIDSET conference in 2007

### Sub-Theme 3: SET R&D and Deployment Strategies: Case Studies

Problems identified	Strategies to address the problem	Actions proposed	Objectives of such actions	Responsible actors	Expected outcomes
Inadequate funding by the industries *	Encourage development of policies to charge a 1% or more levy on industries for S&T development	(i) Develop common programmes & projects that will attract interest from industry and justify their support	The objective is to create room for joint funding of projects	-Industry -Universities	Joint funding of projects
		(ii) Engage governments to develop policies for S&T funding by industries and private sector	The objective is to institute mechanisms for a 1% or more levy from industries and private sector for S&T	-Governments -Industry -Universities	Increased funding to SET training
<b>(b) SET Strategic Planning within Africa</b>					
Lack of communication and transparency between African universities	Encourage cooperation among universities to help foster better communication and reduce duplication of programmes and research in the region	Institutions to aim at strengthening respective strategic areas defined by such factors as environment, tradition and history	To reduce duplication of research efforts and academic programmes given that most of the institutions are founded on strategic areas of strength	-Universities	-Improved communication -Reduced duplication of research projects across the region

\* Issues marked with this symbol were also identified as problem areas in the previous COVIDSET conference in 2007



### Sub-Theme 3: SET R&D and Deployment Strategies: Case Studies

Problems identified	Strategies to address the problem	Actions proposed	Objectives of such actions	Responsible actors	Expected outcomes
Poor records and follow-up on research findings	Invest in information systems to help keep good records	(i) Establish institutional databases of equipment for S&T with details on age, usage and students benefits	To help identify resources available	-Universities	Databases on available resources
		(ii) Encourage institutions to develop databases for research findings and post them on their websites not only for their own visibility and impact but also as a means to sharing information and hence create regional synergy for research	To facilitate development if strategic plans for SET and possibility of sharing the equipment within the region	-Universities	Databases and updated websites on research findings
Low involvement of most stakeholders	Enhance communication to stakeholder on areas of active research and possible common interest	Identify strategic areas in which stakeholders can be involved in terms of co-funding for common projects	To develop a close working relationship with stakeholders and gain their support, input and finally funding of research programmes	-Universities -Stakeholders (donors, society, industry, government, other agencies)	A more closer working relationship based on information sharing and joint projects

\* Issues marked with this symbol were also identified as problem areas in the previous COVIDSET conference in 2007

### Sub-Theme 3: SET R&D and Deployment Strategies: Case Studies

Problems identified	Strategies to address the problem	Actions proposed	Objectives of such actions	Responsible actors	Expected outcomes
Inconsistency in government policy on SET	Encourage regular reviews of government policies on SET and align them with existing situations and other related policies	(i) Institutions and ANSTI to organise forums with governments to iron out differences in policy on SET.	To develop a clear understanding of respective governments' agendas in terms of developing SET	-Governments -Universities	A clearer government policy on SET
		(ii) Institutions to be more proactive and study government policies on SET with a view to submitting proposals to facilitate their harmonisation and improvement	To positively influence governments' policies on SET and make them more focused to institutional goals and objectives	-Universities in partnership with governments	Focused government policies targeting institutional goals

\* Issues marked with this symbol were also identified as problem areas in the previous COVIDSET conference in 2007

## Sub-Theme 4: Investment in R&D and Deployment in Africa

Problems identified	Strategies to address the problem	Actions proposed	Objectives of such actions	Responsible actors	Expected outcomes
<b>(a) Internal Investment Challenges</b>					
Need for high quality of R&D products	Develop quality assurance systems and standards Encourage more investments at research and production phases	Institutions should invest more in research and production phases	To ensure that affordable and high quality products are produced	Universities	High quality R&D products
Need for good governance in universities and research institutions	Encourage rewards & sanctions methods of management	ANSTI & donor agencies should link good governance to funding for projects	To ensure that funds given for research projects are put into good use and for the intended purpose	-Universities -Governments	Better managed institutions
Lack of appropriate infrastructure *	Encourage more investments into infrastructure projects	Institutions should put in place policies and strategies for developing appropriate infrastructure for ICT, laboratories, and other basic physical space requirements	To provide an environment for conducting high quality research	-Universities -Governments	Improved infrastructure

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## Sub-Theme 4: Investment in R&D and Deployment in Africa

Problems identified	Strategies to address the problem	Actions proposed	Objectives of such actions	Responsible actors	Expected outcomes
<b>(b) External Investment Challenges</b>					
Lack of tax waiver incentives	Strengthen cases for tax waiver opportunities	Identify SET and R&D areas that need tax rebates and/or waivers and recommend to governments	To provide incentives and reduce cost for R&D investments	Universities in partnership with industry and governments	Improved incentives /tax waiver mechanisms and systems
Public negative perception of R&D	Develop mechanisms for improving public perceptions of R&D successes	Where possible deploy/ transfer proven intermediate results for societal use as soon as possible	To shorten the period of return on investments and hence reduce negative public perceptions	Universities	Improved public perception
Low Diaspora involvement *	Encourage collaborative research work using the Internet and other online systems	Engage the experts in the Diaspora through online exchange of ideas and short-term academic visits	To involve the Diaspora in local academic activities and hence create interest and possible areas of research and convergence of ideas	Universities Diaspora	Improved involvement of Diaspora on regional SET activities

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### Sub-Theme 4: Investment in R&D and Deployment in Africa

Problems identified	Strategies to address the problem	Actions proposed	Objectives of such actions	Responsible actors	Expected outcomes
Lack of planning on R&D and SET	Make use of available information to make long term plans for SET development	Governments and stakeholders should make use of various recommendations on the status of S&T in our respective institutions for effective long term planning	To make productive use of reports, data and information on our institutions	-Governments -Universities	Improved planning for S&T developments

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ANSTI Secretariat  
UNESCO Nairobi Office  
P.O Box 30592 – 00100 Nairobi, Kenya  
Telephone: (254-20) 7622620  
Email: [info@ansti.org](mailto:info@ansti.org)  
Website: [www.ansti.org](http://www.ansti.org)