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**EXTRAORDINARY CONFERENCE OF THE
AFRICAN MINISTERS OF COUNCIL ON
SCIENCE AND TECHNOLOGY (AMCOST)
20 – 24 NOVEMBER 2006
CAIRO, EGYPT**

EXT/AU/EXP/ST/12(II)

**CRITERIA AND GUIDELINES FOR ESTABLISHING
AFRICAN NETWORKS OF CENTRES OF EXCELLENCE
IN SCIENCE AND TECHNOLOGY**

This Document was produced by New Partnership for Africa's Development Secretariat



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INTRODUCTION

1. In September 2005 the African Ministerial Council on Science and Technology (AMCOST) adopted Africa's Science and Technology Consolidated Plan of Action (CPA) comprising of specific flagship programmes to be implemented by networks of centres of excellence. The African Union (AU) Commission and the New Partnership for Africa's Development (NEPAD) Office of Science and Technology were mandated by AMCOST to develop specific criteria for identifying institutions that would be designated as AU/NEPAD networks of centres of excellence in science and technology, including social sciences.

2. There are at least two reasons why there is a need for African countries to establish AU/NEPAD networks of centres of excellence. The first is to enable the continent pull together and efficiently use its scarce human and infrastructural resources. Many African scientists, engineers and technicians as well as institutions are confronting similar problems but tend to work in isolation. By networking the best available institutions, expertises and infrastructure spread over Africa, scientific productivity and innovativeness may be significantly increased. Secondly, establishing networks of excellence will enable the continent to exploit the diversity of institutions and programmes available across the continent.

3. NEPAD Office of Science and Technology as the technical and administrative secretariat of AMCOST commissioned studies and held workshops on criteria and guidelines for establishing African networks of centres of excellence. This document draws together issues and recommendations from the studies and workshops. It focuses on the following two inter-related questions:

- (a) what constitutes a centre of excellence in science and technology? and
- (b) what criteria should AMCOST use to designate institutions as AU/NEPAD centres of excellence in science and technology?

1. CONCEPTUAL ISSUES

1.1 What constitutes a centre of excellence in science and technology?

4. The concept of centres of excellence has acquired so much currency that it is in the lexicon of many policy makers, researchers, politicians, donor agencies and,

generally, the international community. The concept has recently been used or at least referred to by such international processes as the 2002 World Summit on Sustainable Development (WSSD)'s Plan of Implementation and the 2005 Commission for Africa report *Our Common Interest*. Yet its precise meaning is less explored. The concept is interpreted differently by different people and institutions.

5. It is actually not easy, and possibly a not very useful exercise, to establish one single/standard definition of a centre of excellence in science and technology. What is crucial is to develop and agree on some key features or characteristics of institution(s) that possess or aspire to have measurable excellence in scientific research and technological innovation. For this purpose, the following key features should be considered:

- (a) *Institutional identity*—an identifiable formal or informal organization with specific values, norms and rules;
- (b) *Existence of and ability to build and sustain a critical mass* of internationally or regionally (African) reputable or recognized scientists and/or engineers, technicians, and technology innovators;
- (c) *An identifiable governance structure* with a clear mechanism(s) and hierarchy for making decisions;
- (d) *Demonstrated role(s) to contribute to human development* by adding knowledge to global science or generating specific products in a national or international economic system;
- (e) *A reasonable measure of stability* of operating conditions and funding over a specified period of time;
- (f) *Organizational dynamism* in terms of ability to adjust to and influence the external environment or demonstrated ability of an organization to renew itself and grow even during hostile external conditions;
- (g) *Institutional articulation* largely judged by the organizations networking capabilities i.e. ability to forge and sustain productive partnerships with other institutions; and
- (h) *Relevance* an institution's or network's mission, programmes and outputs to sustainable development goals set by country and/or the international community

6. It is important to stress that a centre of excellence evolves organically. It is not assembled as a physical entity through isolated events or programmes. The evolution of a centre of excellence is characterized by some measure of uncertainty. It is not entirely dependent on such aspects as the availability of physical infrastructure and large sums of money.

1.2 Typology of centres of excellence

7. Centres of excellence may take the following forms:

- (a) multidisciplinary teams of individuals from different institutions either formal or informal. The teams are assembled to solve specific problems. These are largely networks of problem-solvers and innovators.
- (b) Networks of existing institutions whose facilities, expertise and structure get linked together to implement specific programmes.
- (c) Single centres such as a university department or institute.

2. PERFORMANCE INDICATORS AS CRITERIA FOR DESIGNATING CENTRES OF EXCELLENCE

8. There are no internationally set criteria for identifying and designating centres of excellence in scientific research and technology. However, some indicators can be used to identify institutes that have acquired or are likely to acquire status of a centre of excellence. Below is a proposed list (drawn from the studies and workshops conducted by NEPAD). It is not exhaustive but may inform decision-makers and help AMCOST to take a common approach to establishing institutional arrangements for implementing its CPA. The indicators can also be used by other AU commissioners such as those responsible for agriculture and rural development, energy, and trade and industry.

Indicators of performance for a centre of excellence¹

(1) Scientific outputs

- Number of peer reviewed publications;
- Number of patents, national and international;
- Percentage of projects devoted to sustainable development objectives such as environmental protection, improvement of water quality, and energy saving,
- Level of scientific excellence, as determined by an external evaluator on the basis of peer judgment
- Relevance to the building of capability in the institute, number of post-doctoral scientists trained;

(2) Output of services

- Number of clients per specific categories
- Volume of revenues
- Percentage of annual growth in R&D and non-R&D services
- Percentage of value of services related to sustainable development

(3) Indicators for capability building

- (a) Human resource development
 - percentage of scientists with training in advanced areas
 - percentage of scientists undergoing training for a higher degree

¹ These are drawn from Araoz, A. 2003. 'R&D Centers of Excellence as Instruments for Development'. Draft Paper for the Centre for International Development (CID), Harvard University; and NEPAD workshops on building networks of centres of excellence

- Satisfaction of scientists regarding opportunities for personal development, established through a survey

(b) Networking

- Number of quality institutions actively interacting with the institute (exchange of personnel, exchange of information, joint activities, etc.) at home and abroad
- Number of scientific events attended, at home and abroad
- percentage of institute's budget devoted to interactions, at home and abroad

(c) Relationships with government and funding agencies

- Appraisal of relationships, as determined by an external evaluator.

(4) Indicators for delivery system/entrepreneurship

- percentage of income from clients in total budget
- percentage of costs of developing awareness (market research, advertisement, brochures, exhibitions, personal contacts, presentations, Internet, etc.) in total income from clients
- percentage of repeat clients in total clients
- Number of new service areas launched

(5) Indicators for management

(a) Personnel management

- Remuneration of scientists (base salary plus incentives) at entry level and senior level. Comparison with remuneration in non-R&D sectors
- percentage turnover of scientists (should not be too high or too low)
- Staff satisfaction with working conditions, established through a survey

(b) Financial management

- Appraisal of quality of financial management determined by an external evaluator

(c) Project management

- percentage of projects delivered on time
- percentage of projects delivered within project budget
- Degree of autonomy at project leader level

_ dynamic leadership

(6) General indicators of performance for the institute

- percentage of growth of budget
- percentage of growth of staff
- percentage of growth of client income in budget
- Number of national missions/assignments in which the institute is involved

- Number of scientists that have received national and international awards
- Number of scientists in international committees, boards of journals, etc.
- Satisfaction of government and its agencies with institute's excellence and performance, established through a survey (qualitative, A to E)
- Satisfaction of industry with institute's excellence and performance, established through a survey

9. The indicators show that a centre of excellence is an institution or a network that is making impact—effectively and efficiently solving or contributing to the solution of specific problems. To qualify as a centre of excellence an institution should have achieved demonstrable high levels of scientific productivity and innovation on the basis of agreed upon standards. It should have developed structures and activities oriented to build capacity. “This may be understood as the ability to (i) improve the quality of human resources through training and the work involved in producing excellent scientific outputs, (ii) enlarge the access to knowledge through networking with the international scientific community and other means, and (iii) relate to funding sources that may support expansion and upgrading. The possession of a satisfactory competence in capability building is a necessary characteristic if the institute is to keep up its level of excellence and improve on it.”²

² Araoz, A. 2003. ‘R&D Centers of Excellence as Instruments for Development’. Draft Paper for the Centre for International Development (CID), Harvard University.