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**First Advisory Board Meeting on
Science and Technology for Africa's Development**

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**ECA SCIENCE AND TECHNOLOGY INDICATORS
FOR MEMBER STATES**

Origins of S&T Indicators

Science and Technology Indicators (STIs) were first introduced in the 1960's as part of an effort to generate rigorous analytic methods to evaluate the social consequences of the huge investments in science at that time. A great deal of efforts have since gone into developing STIs and complex measures have been devised to evaluate all manners of scientific and technological activities.

In the mid-1980s the Vienna Programme of Action on Science and Technology for Development did call for credible measures for assessing the impact of S&T activities on the development process. At the fourth session of the United Nations Advisory Committee on Science and Technology for Development, the committee explicitly urged developing countries to construct science and technology indicators for use by decision makers to make informed decisions on allocation of S&T resources. Again, and more recently in November 1995, the African Regional Conference on Science and Technology (ARCST) appealed to members to "build and periodically upgrade a series of science and technology indicators as a source of needed development information."

Why Science and Technology Indicators?

STIs are needed for the following reasons:

- (i) The need for accountability on the performance of the Science and Technology Systems in order to justify resource allocation and overall investment in the system;
- (ii) STIs lessen subjective judgement and obviate anecdotal evidence;
- (iii) STIs allow policy makers to track changes in the S&T systems and their components over time and to reveal strengths and weaknesses as they develop;
- (iv) They serve as tools to refute or confirm widely held assumptions, hypotheses and theories;
- (v) For the above reasons, STIs therefore serve to give early warning signals and

Some Characteristics of STIs

- (i) STIs like other social indicators describe only a facet of a very complex reality therefore quantitative and qualitative measures should be considered together; related to one another and to society as a whole;
- (ii) Indicators differ from data in that they are measures that explicitly tests assumptions, hypothesis or theories; for mere data, these assumptions remain implicit. For instance, everyone can read vital signs (data) such as blood pressure and sugar level of a patient but it requires a physician to interpret their implicit meanings;
- (iii) STIs will have to be differentiated among the Member Countries because of the vast differences in levels of development, infrastructure and differing developmental objectives.

A Model to Guide STI Construction

In order to provide a rational basis for constructing the STIs and to ensure that outputs are comparable across Member States, the components of the National System of Innovation (NSI) could be used as Indicants, (objects to be measured). For instance, "Government" is one of the 4 key components of the NSI and "Educational System" is an important sub-system that we need to measure. The table that follows is an example of how the NSI model can provide a basis for STI construction.

Science and Technology Indicators of National Level Capabilities

Input Indicators	Output Indicators	S&T Functions
<p>1. Educational System</p> <ul style="list-style-type: none"> ■ Engineering students as % of population ■ R&D as % of GNP etc., 	<p>Engineers with basic technical skills</p> <p>Scientific and technological knowledge</p>	<p>Design and building of infrastructure and industrial capacity</p> <p>Technologies, processes, products</p>
<p>2. Information and communications Information Infrastructure</p> <ul style="list-style-type: none"> ■ Telephones per capita ■ Computers/Population ■ Access to E-mail, Internet 	<p>Data, Information</p> <p>Data, Information</p> <p>Data, Information</p> <p>Data, Information</p>	<p>Increasing intensity to "information society"</p>

The Board is hereby invited to consider the above and:

- suggest ways in which the STI project will be carried out in Member States, the methodology and funding;
- approve the project for execution by the ECA and suggest immediate first steps for commencement.