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United Nations Conference on Trade and Development

SCIENCE AND TECHNOLOGY DIPLOMACY
Concepts and Elements of a Work Programme

United Nations
New York and Geneva, 2003

NOTE

The UNCTAD Division on Investment, Technology and Enterprise Development serves as a focal point within the United Nations Secretariat for all matters related to foreign direct investment, transnational corporations, enterprise development, and science and technology for development. The current work programme of the Division is based on the mandates set at the Tenth Conference of UNCTAD held in Bangkok in 2000 as well as on the decisions by the United Nations Commission on Science and Technology for Development, which is serviced by the UNCTAD Secretariat. In its work in the area of science and technology, the Division aims at furthering the understanding of the relationship between science, technology and development, contributing to the elucidation of global issues raised by advances in science and technology; promoting international cooperation on science and technology among Governments, enterprises and academic sectors, particularly between those of developed and developing countries and transitional economies; and promoting technological capacity-building and enhancing entrepreneurship and competitiveness in developing countries, particularly the least developing among them.

This publication seeks to contribute to exploring current science and technology issues with particular emphasis on their impact on developing countries.

The term "country" as used in this study also refers, as appropriate, to territories or areas; the designations employed and the presentation of the material do not imply the expression of any opinion whatsoever on the part of the Secretariat of the United Nations concerning the legal status of any country, territory, city or area or of its authorities, or concerning the delimitation of its frontiers or boundaries. In addition, the designations of country groups are intended solely for statistical or analytical convenience and do not necessarily express a judgement about the stage of development reached by a particular country or area in the development process.

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PREFACE

This paper elaborates the conceptual basis and elements of a programme of work on science and technology diplomacy for the United Nations Conference on Trade and Development (UNCTAD). This programme is being developed in accordance with resolution 2001/31 of the United Nations Economic and Social Council (ECOSOC), adopted in July 2001, following recommendations of the United Nations Commission on Science and Technology for Development (UNCSTD) and consultations with the Secretary-General of UNCTAD.

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SCIENCE AND TECHNOLOGY DIPLOMACY

Concepts and Elements of a Work Programme

INTRODUCTION

The aim of this paper is to elaborate the conceptual basis and elements of a programme of work on science and technology diplomacy for the United Nations Conference on Trade and Development (UNCTAD).[1] The term "science and technology diplomacy" is used to mean the provision of science and technology advice to multilateral negotiations and the implementation of the results of such negotiations at the national level. It therefore covers activities at the both international level and national level pursuant to international commitments. This programme is being developed in accordance with resolution 2001/31 of the United Nations Economic and Social Council (ECOSOC), adopted in July 2001, following recommendations of the United Nations Commission on Science and Technology for Development (UNCSTD) and consultations with the Secretary-General of UNCTAD.

More specifically, the decision asked UNCTAD to "develop special programmes and organize workshops… to contribute to ongoing programmes for training scientists, diplomats and journalists in science and technology diplomacy, policy formulation and regulatory matters to assist developing countries, in particular least developed countries, in international negotiations and international norms and standard-setting". The aim of this paper is to outline the concepts that underlie this programme, identify areas of focus for the organization and detail strategies for carrying out its activities.

This document is based on the view that advances in science and technology have become key drivers in international relations, and knowledge of trends in key fields is an essential prerequisite to effective international negotiations. Knowledge of trends in science and technology is also a key element for the successful national implementation of international agreements.

There are two key features of the growth of scientific and technological knowledge that are central to international negotiations. Firstly, scientific knowledge is becoming increasingly specialized and therefore demands greater expert input into international negotiations. Secondly, the application of science and technology to development requires the ability to integrate the divergent disciplines that are needed to solve specific problems. International diplomacy now demands that government negotiators deal with both specialization and integration.

This paper is divided into three sections. The first section provides an overview of relationships between technology and diplomacy and of functions within the United Nations and uses these as a basis for advancing the case for science and technology diplomacy. The second section outlines the objectives and activities of the initiative in focusing upon areas of current diplomatic attention, as well as prospective importance at both the international and national levels. The third section presents options for the mobilization of the resources required to implement these activities. Although the paper

[1] This paper focuses on elaborating the conceptual basis and elements of the work programme since the requisite decisions on its activities have already been made. This paper, however, is not a project document with specific operational details, which will be presented separately.

focuses on activities that will be carried out by UNCTAD and the Science, Technology and Innovation Program (STIP) at Harvard University's School of Government, it is open to participation by other institutions.[2]

1. SCIENCE, TECHNOLOGY AND GLOBAL DIPLOMACY

1.1 Science and technology in international relations

1.1.1 Knowledge and diplomacy

New, emergent forms of international diplomacy are developing to deal with a number of emerging issues in which science and technology play a central role. The influence and effectiveness of diplomats and international civil servants increasingly depend upon the extent to which they can mobilize scientific and technical expertise in their work. In order to assist these decision makers acquire the requisite knowledge needed to participate effectively in international negotiations, the United Nations is well positioned to tap advisory services to identify, mobilize, and use the best available expertise.

Although a large number of UN agencies, programmes and treaties rely on scientific and technological expertise for their work, they are not designed to receive systematic science advice as a key basis for effective performance. The UN was founded and grew to prominence in the era of the Cold War, when much of diplomacy was devoted to dealing with threats arising from external aggression. Today, attention is turning to issues such as infectious diseases, environmental degradation, electronic crimes, weapons of mass destruction, and the impacts of new and emerging technologies, which in the past would have been the concern of individual nations but have now grown in scale and importance to require international recognition and coordinated responses. The UN's capacity to deal with these questions has grown and continues to grow correspondingly.

National bodies that provide scientific advice often do not have a clear focal point in the UN system. However, as scientific and technological issues increasingly dominate global affairs, ways must be found to provide a forum for global consensus building on scientific issues, and the UN's ability to convoke States and other actors makes it a good candidate for the task. Such a forum will not be a substitute for the activities carried out under the various specialized agencies of the UN, but it will support and promote cooperation in the work of national academies, as well as other science advisory bodies.

Innovations in global governance are likely to occur on the margins of the UN system, especially in forums that allow for creative participation of the scientific community and

[2] There are a number of other international institutions such as the United Nations Environment Program (UNEP), the United Nations Educational, Scientific and Cultural Organization (UNESCO), the World Health Organization (WHO), the Food and Agriculture Organization (FAO), the World Meteorological Organization (WMO), the World Trade Organization (WTO), the World Intellectual Property Organization (WIPO), the World Bank and the International Telecommunications Union (ITU) that deal with science and technology issues on a regular basis. In addition, there are a number of regional development organizations that could also benefit from a programme on science and technology diplomacy.

civil society. Forums that assume that States are the only actors will hold onto their traditional roles, but will contribute less to the emerging diplomatic scene. Treaties such as the United Nations Framework Convention on Climate Change (UNFCCC), the Convention on Biological Diversity (CBD) and the Convention to Combat Desertification (CCD) that provide space for the participation of non-state, knowledge-based actors have been able to rally the input of the scientific and technological community to the benefit of their goals. The UN needs to draw more from the world's fund of scientific and technological knowledge. This requires a clear recognition of the role of non-state, knowledge-based actors in general and scientific associations and organizations in particular.

1.1.2 The global trading system

The finalization of the Uruguay Round of trade negotiations created a new international trading regime that reinforced the importance of developing measures that enhance international competitiveness among countries. The outcomes of the Uruguay Round were codified in a set of agreements under the World Trade Organization (WTO) and an in-built agenda for the continued liberalization of the world economy. The first five years of the regime witnessed debates on the impact of globalization on non-OECD countries. In addition, there are continuing debates on the implications of trade liberalization on the environment and social welfare in general. These debates threatened to derail the functioning of WTO, following the collapse of the Seattle Ministerial meeting in 1999. In the post-Doha Ministerial meeting, non-OECD countries continue to be concerned about securing market access.

One of the main features of globalization is the degree to which it highlights and may, in fact, exacerbate variations in competitive capabilities among non-OECD countries. Developing countries have raised concerns over the impact of international agreements on their abilities to strengthen their productive capacity through trade-related industrial and investment measures. More specifically, these countries are concerned about the degree to which they can formulate policies that enhance technological development without contravening WTO rules. These narrow issues raise wider concerns about the role of technological innovation in the ability of non-OECD countries to enhance their competitiveness in an increasingly integrated world.

Many of the policies that guide non-OECD economies predate the entry into force of the WTO agreements. Part of the challenge facing these countries is to bring their policies and laws in line with the new regime. Much of the discussion on this topic has focused on the Agreement on Trade-related Aspects of Intellectual Property Rights (TRIPs). Little is known about the impact of the regime on other policies, especially those that relate to technological development and innovation.

Indeed, the Doha Ministerial Conference recognized this point and has set up a WTO Working Group to review the relationships between trade and technology transfer. The ministers agreed to "an examination, in a Working Group under the auspices of the General Council, of the relationship between trade and transfer of technology, and of any

possible recommendations on steps that might be taken within the mandate of the WTO to increase flows of technology to developing countries. The General Council shall report to the Fifth Session of the Ministerial Conference on progress in the examination". The establishment of the Working Group opens up opportunities to introduce the issues of science and technology and their relation to trade into the multilateral trading system.

Three factors related to the functioning of the trading system limit technology transfer and reduce opportunities for innovation in developing countries. These are: tariff peaks and escalation with stages of processing, the lack of capacity to import technology embodied in machinery and equipment, and the vulnerabilities of developing country exports to *changes* in standards, notably sanitary and phyto-sanitary standards (SPS)[3].

Tariff peaks and escalation reduce the scope for product diversification as well as technology accumulation. Recent research shows that intra-industry trade plays a larger and more significant role in transferring technology that does inter-industry trade[4]. For the vast majority of the developing countries, engaging in intra-industry trade implies substantial upgrading of their products and process and production methods.

The prospects for technological upgrading are compromised by the diminishing capacity of developing countries to import capital goods. Part of the problem is a lack of financing opportunities. Another problem lies in the absence of credible and impartial information concerning both the nature of the technology to be imported and the tacit knowledge elements that are required for its effective use, as well as the learning needed for its absorption.

There is a clear relationship between technological and regulatory capacity, which accounts for the fact that the majority of the developing countries are "standard-takers" rather than "standard-makers". Standards are benchmarks of technological achievement; they embody considerable technical information and know-how. At the same time, standards are major determinants of trade flows and policies and as such may have positive and negative effects. They can promote market efficiency and expansion, foster trade, encourage competition, enable interoperability among products. They can also raise transaction costs and entrench inferior technologies. In other words, standards may raise or lower barriers to trade, and they can speed diffusion of new technologies or constrain innovation.

1.2 Science and technology functions within the United Nations system

This section reviews the background of the current science and technology functions within the United Nations system and uses them as a basis for advancing the case for science and technology diplomacy. An assessment of the functioning of the United Nations system related to sustainable development reveals specific functions that are

[3] Lynn Mytelka, "Creating Opportunity for Learning and Innovation through Trade and Transfer of Technology", 1st session WTO Working Group on Trade and Transfer of Technology, Geneva, 20 April 2002.
[4] Ibid.

performed by different agents. These functions include: policy guidance and advocacy; norm-setting; research and training; monitoring and reporting; operations and technical assistance. The activities outlined below are only indicative and do not represent the full scope of the functions of the United Nations system.

1.2.1 Historical perspectives

The United Nations system has experimented with a variety of ways of dealing with science advice over the decades. The changes in the structure and content of science advice have been influenced by dominant political trends related to the perceived role of science and technology in global affairs. There are two major aspects to the trends. The first relates to discussions on the role of science and technology in global affairs in general and in international development in particular. The second deals specifically with the role of science and technology advice. The two trends overlap considerably, and much of the debate regarding science and technology advice has focused on issues pertaining to the relationships between developing and developed countries.

Table 1: Evolution of science and technology advice within the United Nations system

1945	United Nations officially chartered at conference in San Francisco, CA, USA
1963	United Nations Conference on the Application of Science and technology for the Benefit of Less Developed Areas. This conference marked the origins of the UN focus on science and technology as useful and important tools for development. It was based on the view that the developing countries "leapfrog" across generations by adopting technologies developed in the industrialized countries. The conference resulted in a multifaceted approach to science and technology advice: 1. The Committee on Science and Technology for Development (CSTD) was to be a new component of ECOSOC. 2. The Advisory Committee on the Application of Science and Technology for Development (ACAST) was made up of experts in the various fields of science and technology and was created to provide science advice to CSTD and other UN bodies. 3. The Office of Science and Technology (OST) was created as a part of the UN Secretariat to support both of these groups and assist in the implementation of the advice.
1979	United Nations Conference on Science and Technology for Development (UNCSTD). This conference was convened after criticism of the science and technology advice system put in place in 1963. The resulting Vienna Program of Action called for an updated version of the existing mechanism and placed emphasis on the need for capacity building and technology transfer. 1. The Intergovernmental Committee on Science and Technology for Development (IGC) was to replace the CSTD in its capacity of setting science and technology directives. 2. The UN Advisory Committee on Science and Technology for Development (ACSTD) replaced the ACAST. This new group was comprised not only of scientists, but experts from government and business sectors as well. 3. The OST was upgraded and renamed the Center for Science and Technology for Development (CSTD). 4. A funding mechanism was put in place and dubbed the UN Financing System for Science and Technology for Development (UNFSSTD).
1992	The IGC and the ACSTD were abolished and in their place, the General Assembly mandated the Commission on Science and technology for Development (CSTD). The CSTD provides the General Assembly and ECOSOC with high-level advice on relevant science and technology issues through analysis and appropriate policy recommendations or options. Since July 1993, the UNCTAD secretariat has been responsible for the substantive servicing of the Commission.
2002	The CSTD is still relied upon for science and technology directives within ECOSOC and the UN at large. Other bodies of the UN have modeled science and technology advisory mechanisms after the ECOSOC model, making modifications as they suited the general purposed of the specific UN body.

Explicit science advice systems within the UN can be traced back to the 1963 Conference on the Application of Science and Technology for the Benefit of Less Developed Countries. The conference proposed that transfer of technology from industrialized to developing countries could enable developing regions to transform their economies at a rapid rate. The conference created the Committee on Science and Technology for Development (CSTD) as an organ of ECOSOC; the Advisory Committee on the Application of Science and Technology for Development (ACAST) involving experts in various fields of science and technology; and the Office of Science and Technology (OST) within the UN Secretariat.

The UN Conference on Science and Technology for Development in 1979 in Vienna established science and technology advisory mechanisms. The UNCSTD included experts from business, government, science, technology and other areas. The UN Financing System for Science and Technology for Development (UNFSSTD) was established by the UN in 1979 as a voluntary fund to finance advancements in science and technology and enhance technology transfer.

Other science advice on the environment and natural resources was channeled through institutions such as the United Nations Environment Programme (UNEP) and specialized agencies such as UNESCO and FAO. These organs would later host a wide range of science advice activities that not only informed decision-making, but also helped create a new generation of environmental treaties that incorporate some of the principles of science advice articulated for development purposes. For example, the conventions dealing with climate change, biodiversity and desertification have strong technology transfer provisions similar to those advocated for the general development purposes.

1.2.2 Policy guidance and advocacy

Policy guidance and advocacy are central functions of many international organizations. They are provided through universal bodies such as the UN General Assembly, or through the decisions of the conferences of the parties to the various international agreements. The Millennium Declaration issued by the UN General Assembly in 2000 is an example of a guidance and advocacy statement. The effectiveness of the declaration depends largely on the extent to which its elements are translated into the intergovernmental, governmental and non-governmental programmes.

There are several notable and widely acknowledged systems that have prioritized and successfully linked science and technology to decision-making processes in health, global resources and development. These include World Health Organization (WHO)–led activities on public health and vaccination efforts; international treaties addressing stratospheric ozone depletion; and agricultural research and technology development coordinated by the Consultative Group on International Agricultural Research (CGIAR).

Another well-recognized example is the substantial impact of the Intergovernmental Panel on Climate Change (IPCC) on policy. This Panel provides assessments to the scientific community and policy makers dealing with many issues including climate,

ozone, biodiversity, energy and water. The World Meteorological Organization and UNEP created IPCC in 1988 to provide inputs decision-making processes by reviewing the latest scientific literature. The IPCC's First Assessment Report in 1990 helped to launch the UN Framework Convention on Climate Change. The Second Assessment Report in 1995 led to the negotiation of the 1997 Kyoto Protocol. The Third Assessment Report in 2001 is likely to play a key role as Governments assess measures to protect the climate and examine the implications of climate change.

1.2.3 Norm-setting

A number of UN agencies are engaged in generating norms (rules, principles, standards and guidelines). Indeed, this is one of the most important functions of the UN system. These norms are often codified in the form of treaties or expressed as non-binding soft laws. They aim at changing behaviour through actions by member States. The guidance and advocacy are provided either through a universal body such as the UN General Assembly, or through the decisions of the conferences of the contracting parties to the various international agreements. Various UN-related agencies are also involved in setting technical standards. Examples include the International Civil Aviation Organization (ICAO) and the World Meteorological Organization (WMO).

1.2.4 Research and training

The United Nations conducts two kinds of research and training. The most dominant is economic and social science research that is carried out by institutions such as the United Nations Conference on Trade and Development (UNCTAD), the United Nations University (UNU), the United Nations Research Institute for Social Development (UNRISD) and the United Nations Institute for Research and Training (UNITAR). Much of the research carried out by these institutions seeks to provide policy recommendations to Governments and the general public.

UNCTAD is one of the United Nations organizations most actively involved in policy analysis on science and technology, especially on technology transfer. UNCTAD has carried out extensive research into investment, enterprise development and technology to provide policy advice to developing countries to attract resources and investment. UNCTAD's activities in science and technology include analysis and identification of policies that favour technological capacity-building, innovation and technology flows to developing countries, through review of experiences among countries at different levels of technological development. UNCTAD also monitors technological developments to identify and analyse the opportunities they offer for strengthening technological capabilities, competitiveness and enterprise development. Research and intergovernmental discussions have recently focused on capacity-building in biotechnology, information and communication technologies (ICTs) and other emerging technologies. UNCTAD has further researched the commercialization of science and technology, including issues relating to marketing and intellectual property protection.

The research and intergovernmental discussions on technology transfer that have been carried out by UNCTAD have covered:

- International conventions and arrangements
- Code of conduct for technology transfer
- Channels, mechanisms and best practices
- Acquisition and absorption of new technologies
- Technology partnerships
- Intellectual property rights and protection of traditional knowledge
- Trade and the environment, including ESTs
- Country and sectoral case studies
- Biotechnology and information and communication technologies

Through this work, it has contributed to the conceptualization of technology issues and policy analysis, and supported negotiations in various forums. The work can be accessed through a compendium of technology reports, posted on STDEV (www.unctad.org/stdev).

The second but less dominant category is basic research focusing on specific regional challenges. For example, the International Center for Genetic Engineering and Biotechnology (ICGEB) located in Trieste, Italy, and New Delhi conducts research, provides services to member States and undertakes training. ICGEB's research covers both basic and applied research problems, focusing on developing country problems such as novel malaria and hepatitis vaccines and studying human pathogenic viruses, human genetic diseases, and the genetic manipulation of plants. More than 300 people from 30 different countries work in its laboratories.

Similar training and informatics services are provided by other UN entities, such as the Programme for Biotechnology in Latin America and the Caribbean of the United Nations University (UNU/BIOLAC) established in July 1988 in Caracas, Venezuela. The aim of the programme is to promote the development of biotechnology in the Latin American and Caribbean region, covering issues such as agricultural biotechnology, industrial microbiology, medical biotechnology, industrial relations, molecular pathology, genomics, manufacturing, and molecular biology.

1.2.5 Monitoring and reporting

Monitoring trends and reporting on progress are key functions of United Nations agencies. Many of these institutions have elaborate mechanisms for these tasks, which include national offices. The World Meteorological Organization (WMO) collects data related to changes in the weather and has played an important role in providing information for international decision-making on issues related to global change. Other international institutions also monitor technological development, especially for purposes of setting performance and safety standards. Examples of these institutions include the International Standardization Organization (ISO), the International Civil Aviation

Organization (ICAO) and the International Telecommunications Union (ITU). Another organization that monitors and documents technological trends is the World Intellectual Property Organization (WIPO). Many of these organizations operate through networks of national and regional institutions, and information is brought together for setting standards, decision-making and legislation.

In the field of environmental management, the function of monitoring technological development is currently restricted to a few institutions working on specific technical problems, such as developing substitutes for ozone-depleting substances. The ozone regime has a strong scientific and technological basis and is structured to focus on identifying alternatives to ozone-depleting substances. In addition to its technology monitoring function, the ozone regime also incorporates a mechanism to provide financial assistance to help countries phase out ozone-depleting substances.

1.2.6 Operations and technical assistance

Operational functions among international organizations range from the implementation of specific projects to technical assistance and the provision of finance in various forms. Operational activities are carried out by agencies dealing with issues such as development administration, agriculture, children, refugees, food aid, environment and population. Many of these involve issues related to science and technology in general and technology transfer in particular. The United Nations has, over the years, been a major provider of technical assistance to developing countries. A wide range of organizations provide the assistance but much of the work at the country level is coordinated through the United Nations Development Programme (UNDP).

UNDP is the largest programme of the United Nations. An administrator, four deputy administrators, and a 36-member Executive Board that meets twice a year in regular session and in an annual session oversee it. Its operations are managed by a secretariat located in New York, with offices in 136 countries. Since its reorganization in 2000, UNDP relies on a new financial instrument, the Thematic Trust Funds, to finance its goals. The key attribute of these funds is the ability for donors to provide additional contributions for work in specific UNDP practice areas in a multi-year funding framework. For the period 2001–2003, the Energy Trust Fund has resources of $60 million, $51 million of which is allocated to country offices and $9 million to global and regional programmes.

In addition to its operational programmes, UNDP houses the Human Development Report Office that produces an annual report on a variety of themes related to human development. The *Human Development Report* is one of the most authoritative documents produced by the United Nations. It produces a ranking of the performance of countries based on their Human Development Index. More recently, the report has focused on science and technology issues. The Human Development Report 2001 was devoted to “Making Technology Work for Human Development”.

1.2.7 Contemporary developments

The United Nations Commission on Science and Technology for Development (UNCSTD) was established by the United Nations General Assembly in 1992 as a subsidiary body of the Economic and Social Council (ECOSOC). It provides high-level advice on relevant issues through analysis and policy recommendations or options needed to guide the work of the United Nations, develop new policies and agree on appropriate implementation measures. In 1998, ECOSOC reviewed the functions of the Commission and introduced a number of changes in its membership, focus and working methods.

The Commission serves as forum for examining issues related to: (a) the role of science and technology in development; (b) advancing understanding on science and technology policy, especially in respect to developing countries; and (c) formulation of recommendations and guidelines on science and technology matters in the United Nations system. The Commission has 33 member States elected by ECOSOC for a period of four years. It has eight members from Africa; seven from Asia; six from Latin American and the Caribbean; four from Eastern Europe; and eight from Western Europe, North America and other related States. Representatives in the Commission are national experts nominated by their own Governments.

The Commission meets biannually for its regular sessions.[5] At each session, the Commission elects a Bureau (a chairperson and four vice-chairpersons) for the next session. The Bureau is responsible for forthcoming activities during the inter-sessional period. The Bureau establishes *ad hoc* panels or working groups to guide analytical work on substantive issues chosen for each inter-sessional period. Panels are established on the basis of responses to invitations to members to express interest in areas of the Commission's work. The panels take responsibility for the reports, which are normally prepared by the UNCTAD secretariat and presented to the Commission at its regular session. At its regular session , the Commission selects a theme(s) to be addressed during its inter-sessional periods. The Commission has addressed a number of themes, including information technology and biotechnology. Its current theme (2001-2003) is technology development and capacity-building for competitiveness in a digital society.

The Commission is serviced by the UNCTAD secretariat. UNCTAD has played a pioneering role in addressing issues related to science and technology and promoting the interests of developing countries. The substantive backstopping provided by the UNCTAD secretariat to its intergovernmental bodies, combined with the work of the UNCSTD, will help advance the concept of science and technology diplomacy. The presence of the UNCSTD secretariat in Geneva makes it possible to contribute to interaction with activities of institutions such as the World Trade Organization (WTO), the World Intellectual Property Organization (WIPO), the World Health Organization (WHO), the Word Meteorological Organization (WMO) and the International Telecommunication Union (ITU), located in the city.

[5] In response to ECOSOC resolution 2002/37, the UNCSTD will begin to meet annually for its regular sessions, starting 2003.

2. PROGRAMME OBJECTIVES AND ACTIVITIES

The focus of the Science and Technology Diplomacy Initiative is to build capacity in developing countries to address more effectively issues related to the role of science and technology in international diplomacy. The Initiative will be implemented through three main activities: policy analysis (Section 2.1); capacity building, especially human resource development (Section 2.2); and outreach (Section 2.3), with particular emphasis on the use of information and communications technologies.

2.1 Science and technology policy analysis

A key objective of the programme is to undertake analysis on the role of science and technology in international relations, with particular emphasis on issues related to international trade. The analysis will not involve new research, but will draw on existing information and present the analysis in a way that is relevant to the diplomatic and policy-making community, through the use of policy briefs. In its initial stages, the programme will focus on three key areas of current diplomatic attention identified below: international arrangements and provisions on technology transfer; biotechnology and trade; and international standard-setting in the fields of health, safety and environment. It is also important for the programme to identify prospectively areas of growing and future importance. For nations to be able to maintain a presence in international discussions, it is important for them to develop national capacity from the grassroots level in science and technology, through their national science, technology and innovation policy and the development of innovation systems. The distinction is thus drawn between international and national activities.

Areas of current diplomatic attention

Thematic focus 2.1.1 International arrangements on technology transfer and FDI

The abilities to create new technology and to acquire and adapt technologies from both external and internal sources are critical determinants of a country's ability to compete successfully. Given the centrality of technology to economic and social development, and the need for technology acquisition by developing countries as a means of furthering development, it is essential that countries should be able to benefit from the transfer and diffusion of technology. The transfer of technology from foreign sources and from international and domestic research institutes represents a potent source of technological information, particularly for developing countries. Indeed, since the 1970s, developing countries have expressed in various international forums their desire for improved access to foreign technology and enhanced technological capabilities. In the past two decades, specific provisions on transfer of technology have been incorporated into various international instruments. Such provisions have different objectives, scopes and modes of implementation and financing, and are subject to different terms and conditions.

UNCTAD has carried out pioneering work in this area, with its "Compendium of International Arrangements on Transfer of Technology[6]", which identifies and compiles technology-related provisions in international instruments for proprietary technology (including "standard setting" instruments) and direct measures. UNCTAD has also undertaken work on the issue of technology transfer in the context of international investment agreements (IIAs).[7]

Foreign direct investment (FDI) is considered one of the main sources of technology transfer to developing countries. However, the pace, direction and quantity of FDI vary considerably across countries and time. A number of developing countries have reformed their policies in expectation of FDI. Some of these reforms have entailed the erosion of previously established technological capabilities, and in some cases, failure to attract FDI has weakened participation in the global market. FDI is not an automatic carrier of technology, and the ability of any country to benefit from such investment depends on a wide range of policy measures that include the existence of long-term strategies for technological development and requisite capacity to absorb imported technology at the national level. Expertise in science and technology diplomacy in FDI will help developing countries craft FDI policies that are technology-oriented to meet their technological needs, without compromising the interests of foreign investors.

The UNCSTD is expected to carry out further work to investigate the relationship between FDI and technology transfer in the second panel of its inter-sessional work programme for 2001-2003 on “Technology Development and Capacity-Building for Competitiveness in a Digital Society”. This panel will address the role of FDI in the building and transfer of technological and ICT capabilities and enhancing competitiveness. It will examine the instruments used to achieve "deep integration" between foreign affiliates and local firms and suppliers. The outcome will be a menu of policy options for Governments to select and attract appropriate kinds of FDI that are technology-oriented and are compatible with their domestic technological needs and conducive to enhancing domestic capacity building. The panel will address the importance of foreign and domestic investment, particularly in R&D and in ICT infrastructure, to improve industrial productivity and enhance innovation and competitiveness.

Thematic focus 2.1.2 Biotechnology and trade

Biotechnology has opened new opportunities for solving many of humanity's agricultural, nutritional and health challenges. However, the technology is associated with potential risks, which are the subject of extensive international debates. In *"We the Peoples"*, the

[6]United Nations Conference on Trade and Development (2001). *Compendium of International Arrangements on Transfer of Technology: Selected Instruments* (New York and Geneva: United Nations), United Nations publication, Sales No. E.01.II.D.28.

[7] United Nations Conference on Trade and Development (2001). *Transfer of Technology. UNCTAD Series on Issues in International Investment Agreements* (Geneva: United Nations), United Nations publication, Sales No. E.01.II.D.33.

UN Secretary General announced that he intends to set "a high-level global public policy network to address these and related controversies concerning the risks and opportunities associated with the increased use of biotechnology and bioengineering". As well as this international initiative, national academies of science and major producers of genetically modified (GM) crops are also engaged in initiatives in this area. However, it was only after the adoption of the Cartagena Protocol on Biosafety that industrialized nations started to call for scientific assessments of the risks and benefits of agricultural technology. Representatives of more than 130 countries met in January 2000 in Montreal under the Convention on Biological Diversity (CBD) to agree on the Protocol on Biosafety. The Cartagena Protocol on Biosafety was adopted at the end of this meeting, following five years of talks. It is the first legally binding agreement on the trade of genetically modified goods and governs international trade in living modified organisms (LMOs) with a view to reducing any risks associated with the trade of such products. For developing countries to participate effectively in such international discussions, they must call upon biotechnology experts for scientific and technical advice.

As mentioned above, the Commission on Science and Technology for Development selected biotechnology as its substantive theme for 1999-2001. It examined in detail the issues of national capacity-building through basic science education and R&D; transfer, commercialization and diffusion of biotechnology; public awareness and the participation of the public in science policy making; bioethics, biosafety and biodiversity and legal and regulatory issues.

Thematic focus 2.1.3 Managing technological risks, market access and standard setting

Technological risk has become a major area of concern, especially in relation to new technologies. Countries that are at the cutting edge of technological innovation and application are furthest along the learning curve about technological risks, which, however, have the potential to affect all countries, as illustrated by the example of agricultural biotechnology. Much of the discussion about the risks of biotechnology deals with environmental and health issues. The potential failure to manage these risks and benefits effectively is one of the main sources of concern and resistance to the adoption of new technologies. However, the pace and scale at which risks arise threaten the very diffusion of those same technologies that bring about new benefits. The use of pest-resistant crops, for example, offers the potential for a wide range of economic and health benefits. However, those who rely on chemical products for their livelihoods are likely to be direct and indirect sources of resistance to the new technology. Early efforts to identify potential winners and losers are an important part of the technology development strategy. With this identification, it should be possible to manage both the risks and the benefits in a way that allows for relatively smooth technological transitions. This is, indeed, a central theme in science and technology diplomacy, especially where the winners and losers are spatially and temporally diverse.

Limited market access represents the greatest hurdle to international trade and consequently to the capacity of developing countries to invest in technological innovation. Tariff peaks and escalations reduce the desire in developing countries to

export finished products, reducing their interest in product diversification and technology accumulation. The requirement for exporters to meet product standards similar to those found in the importing countries is a critical element in international trade. However, if the exporter's home market standards are different from those of the export market, extra costs have to be incurred to meet the demands. Many developing countries do not have sufficient facilities and appropriate technology or personnel to conform to industrial countries' market demands. These countries often import products that are banned in developed countries, while developed countries are more restrictive when it comes to imports from developing countries. The implications and costs of these measures and other trade inhibitory mechanisms such as countervailing duties, safeguards, and customs and administrative red tape on technology products are great. There is growing understanding of the relationship between market access and technological innovation, and detailed studies in this area could contribute to science and technology diplomacy.

There are institutions that deal with some aspects of risk and benefit management, such as anti-trust legislation. However, these do not address the seemingly benign cases of product displacement. Generally, such adjustments are considered to be part of the evolution of markets. Risks may also be managed through the setting of standards, which seek minimum necessary outcomes and assurances of quality. Standards are benchmarks of technological achievement. They embody a great deal of technical information and know-how. There is a clear relationship between technological and standard setting (regulatory) capacity. The "rediscovery" of technology provisions in WTO agreements has been accompanied by renewed interest in the scientific underpinnings of some of these agreements, particularly the Sanitary and Phytosanitary Measures (SPS Agreement). It has however been argued that standards may represent technical barriers to trade (TBT). This setting of standards and the broadening of the definition of technology transfer to include exchange of knowledge points to the need to promote access to scientific advice.

Negotiations will also start on the liberalization of trade in environmental goods and services (EGS), and on the relationship between the multilateral trade and environmental regimes. Trade in EGS could be conducive to the transfer of environmentally sound technologies. The definitions and classifications of EGS for the purposes of trade negotiations are subject to negotiation. However, in the most likely scenario, environmental goods will be defined narrowly as essentially technology or capital goods. Given the disadvantage of developing countries in access to environmentally sound technologies, trade liberalization in these sectors may give rise to competitiveness concerns. This risk would be even higher if the negotiations were to proceed on the basis of broader definitions of EGS, i.e. definitions derived from the characteristics of the goods themselves and/or process and production methods, rather than their end use.

Further areas for international attention

As discussed previously, it is envisaged that the programme will initially concentrate on the previous three areas as currently receiving significant diplomatic attention. There is

however, a role for this programme to prospectively identify areas of growing and future diplomatic attention, at both the international and the national level.

Thematic focus 2.1.4 International technology alliances

One of the most significant developments in the structure of the global economy is the establishment of networks involving partnering activities. These networks are the products of complex interlinkages between a wide range of enterprises, links that are designed to reduce the risks associated with the development of new products, as well as to facilitate information exchange. More specifically, these partnering arrangements help to provide sources of financing through licensing and upfront fees for research and development expenses, reimbursement of expenses for partnered products and services, royalties, profits and other "success fees" associated with the achievement of certain milestones. Such arrangements are particularly important in areas with limited access to other forms of financing, such as venture capital. Even where venture capital is available, these arrangements still serve an important risk-reducing function. Having knowledge and capacity to craft international technology alliances beneficial to developing countries is an essential element of science and technology diplomacy.

Thematic focus 2.1.5 Intellectual property

The new phase of globalization is associated with strong regimes of intellectual property protection. As a result, there is considerable public interest in the role of intellectual property institutions in the process of technological innovation. Most developing countries are less specialized in R&D-intensive activities and are at a stage of technological learning at which access to patented technologies is not essential for industrial development. The more advanced developing countries need to balance their interest in access to protected technologies with the preservation of the possibility that any of their future inventions will be protected. There are no general models that would enable countries to reflect these various balances in any single strategy.

However, there are specific areas that require policy attention. What is evident, however, is that promoting innovative activity in developing countries is an essential aspect of improving their competitiveness. This in turn requires the creation of institutions that would facilitate access to all types of scientific and technological information. Intellectual property offices play a central role as sources of such information. A better understanding of the role of intellectual property institutions beyond the narrow area of monopoly rights is essential in helping developing countries make appropriate decisions on the subject suitable to their needs.

Further areas for national attention

For nations to be able to maintain a presence in international discussions, it is important for them to develop national capacity in science and technology from the grassroots level, through their national science, technology and innovation policy and the development of innovation systems.

Thematic focus 2.1.6 Science, technology and innovation policy

Most of the science and technology policies in developing countries were formulated in the pre-globalization age. Efforts to reform these policies by focusing on the role of specific sectors, such as information technology, are reaching their limits in many countries. Efforts are under way in a number of countries to incorporate recent research findings in the fields of science, technology and innovation into existing national policies. So far, there are very few international institutions that have the capacity to provide advice to these countries. The challenges associated with globalization demand fresh approaches to national policy formulation. The linkages between trends in international trade and domestic capabilities in science, technology and innovation require greater policy attention.

Thematic focus 2.1.7 Innovation systems

The concept of "innovation systems" has been developed to better understand the linkages among the key actors involved in innovation. The basis of this idea is that understanding the linkages is essential for enhancing technological performance, which in turn is viewed as critical to the process of national competitiveness. Technical change and innovation are a result of a complex and dynamic set of relationships involving actors producing, distributing and using various kinds of knowledge. There is no agreed definition of innovation systems, although the core approaches deal with institutional networks, relationships in the production process and interactions between actors. These are the networks of public and private institutions that interact in the process of initiation, importation, modification and diffusion of new technologies.

Knowledge-based institutions such as universities have a central role to play in the competitiveness of developing countries, but they have received little policy attention in this regard. Essentially, the approach introduces the use of a systems perspective in understanding the process of national competitiveness and its implications for the global economy. Advice on the design of national and regional systems of innovation would help developing countries to make effective use of existing institutions, identify gaps and create incentives for innovation and greater participation in the global economy.

While much of the funding for research in developing countries comes from public sources the balance is shifting toward private sources. The associated institutional imbalances can be a source of diplomatic conflict, especially in international forums designed to discuss financing for research or technology transfer to developing countries. Developing countries are ill equipped to compete with developed countries in the area of technological development and innovation systems. This requires not only government incentives through appropriate policies but also a complex and an elaborate national regulatory environment. Particularly important is the promotion of better interactions between researchers, academic institutions and entrepreneurs so that the results of R&D are commercialized nationally.

2.2 Capacity development

Capacity development covers three areas: human resources; organizations; and institutions. For the purposes of this programme, the focus is on human resource development in the field of science and technology policy. The programme will provide training to diplomats, policy makers, academics and journalists on the role of science and technology in international competitiveness, with particular emphasis on national technology preparedness in a variety of fields. This will be done through technical workshops and executive training sessions, as well as the promotion of professional training.

There are several mechanisms that will be used to identify potential contributors to this effort. For example, the Science, Technology and Innovation Program hosts a number of academic journals such as the *International Journal of Technology and Globalization,* the *International Journal of Technology Transfer and Commercialization* and the *International Journal of Biotechnology.* The contributors to these journals form a readily available source of expertise that can contribute to the analytical work needed for the project. In addition to these sources, UNCTAD operates an elaborate network of experts and consultants who can contribute to this activity.

Activity 2.2.1 Technical workshops

Technical workshops will be convened in Geneva or in other locations to provide participants with introductory information on emerging issues of relevance to ongoing or future negotiations. The duration of the workshops will be 1-2 days depending on the contents and needs. It is envisaged that a minimum of three such workshops will be held a year. Speakers at these workshops will be drawn from academia, international organizations, industry and other sectors, and will be selected on the basis of their knowledge of the issues. The selection of themes will be chosen by UNCTAD on the basis of their relevance to emerging issues that require diplomatic attention.

Activity 2.2.2 Executive sessions for trainers

Training will also be provided to academics interested in setting up science and technology diplomacy programmes in their universities. The focus of such sessions will be pedagogy and curriculum development. The aim is to enable universities in various countries to mount their own training programmes on issues related to science, technology and international diplomacy. These training sessions will last 7-10 days. Speakers at the sessions will be drawn from universities, the diplomatic community, practitioners and other sectors based on proven expertise and training experience. The optimal size for such sessions is 30-40 participants.

Activity 2.2.3 Summer training

Summer training sessions are envisaged to last four weeks and to involve intensive training based on finding solutions to specific policy challenges. The sessions will be

organized in the form of summer institutes on science, technology and development but the contents will be selected on the basis of saliency. Emerging issues such as the management of trade in GM foods could be a subject matter for such sessions. Participants will be senior diplomats, policy makers, journalists and other leaders who are responsible for dealing with particular policy challenges.

2.3 Outreach

Activity 2.3.1 Conferences

The Initiative will convene, in conjunction with STIP and other institutions, an annual event on science and technology and diplomacy. This will be either a stand-alone conference or a key component of a relevant conference.

Activity 2.3.2 Policy briefs

The initiative will prepare short policy briefs based on background papers in the thematic areas identified above or on emerging issues that require diplomatic attention. The briefs will be distributed through the web and other means to Governments and other users. It is envisaged that five policy briefs will be prepared every year. They will also be distributed to participants at the various training sessions.

Activity 2.3.3 Listservs

STIP manages a listserv with more than 2,000 subscribers. This list will be expanded to include the wider constituency of science and technology policy makers. It will be complemented by various UNCTAD mailing lists, such as that of the Science and Technology for Development Network (STDev), which includes members of the UNCSTD.

Activity 2.3.4 Gateways

Web facilities such as the UN Science and Technology for Development Network http://www.unctad.org/stdev and the Science, Technology and Innovation (STI) Program at Harvard University http://www.cid.harvard.edu/cidtech will be used to promote the dissemination of information. The two websites will serve as portals for access to information on science and technology diplomacy. The portal will provide a variety of information sources, including contact details for key national science and technology policy makers. This work will be coordinated with the activities of other relevant institutions such as the Third World Academy of Sciences.

3. PARTNERSHIP AND RESOURCE MOBILIZATION

Supporting UNCTAD activities in science and technology diplomacy will involve mobilizing internal and external intellectual and financial resources.

3.1 Partnerships

This Initiative will be implemented in partnership with the Science, Technology and Innovation Program at Harvard University's Kennedy School of Government. The two institutions are working on the modalities for cooperation on all the activities outlined in this document, including joint resource mobilization efforts. Some of the elements of the training programme are already included in formal training courses at the Kennedy School, covering issues such as "Science, Technology and Development Policy" and "Global Governance of Biotechnology", and will form part of the intellectual basis for the capacity building efforts of the Initiative. Additionally, the ongoing research and planned Kennedy School conferences will also contribute to the effort. This partnership arrangement is open to other institutions. The Initiative will also seek to partner with other international organizations, most notably FAO, UNEP, UNESCO, WMO and the United Nations University, as well as other international scientific organizations, such as the Third World Academy of Sciences.

The Initiative will draw on the expertise that has been acquired over the years across the Divisions of UNCTAD, including on trade, technology, investment and environment. It will especially draw on the input and expertise of relevant UNCTAD projects, most notably the Capacity Building Project on Intellectual Property Rights and Sustainable Development, as well as the Commercial Diplomacy Porgramme and the UNDP/UNCTAD Global Programme on Globalization, Liberalization and Sustainable Human Development. The Project on TRIPS and Development Capacity Building, which is sponsored by the Department of International Development of the United Kingdom, is being implemented by the United Nations Conference on Trade and Development and the International Centre for Trade and Sustainable Development (ICTSD). The broad aim of the Project is to improve the understanding of TRIPS-related issues among developing countries and to assist them in building their capacity for ongoing as well as future negotiations on intellectual property rights (IPRs).

3.2 Internal resources

Internal mobilization of intellectual and financial resources will involve strengthening the internal coordination of science and technology activities at UNCTAD to enable it to assist developing countries' trade diplomats and policy makers understand better the scientific and technological underpinnings related to trade, investment and environmental issues. Mobilization of resources should also involve strengthening the capacity of UNCTAD to respond fully to all the mandates that it receives from both its regular sessions and ECOSOC, including undertaking analytical work on issues related to technology transfer, investment and enterprise development, as well as substantive servicing of the UNCSTD. In 2001, the Joint Inspection Unit (JIU/REP/2001/2)

concluded that "*while the UNCSTD is doing as perfect a job as it possibly can under the present circumstances, especially through its creation of ad hoc panels of experts on specific science and technology issues, the supporting Secretariat structures need to be strengthened. The UNCTAD Secretariat, which absorbed the previous UNCSTD, deserves to have a science and technology dimension added to its core programmes, just like the other UN Secretariat departments in the economic and social sectors, including the regional economic commissions*". Furthermore, current UNCTAD activities in fields such as commercial diplomacy provide opportunities for new synergies with science and technology diplomacy.

3.3 External resources

The implementation of the activities of the Science and Technology Diplomacy Initiative will depend on the mobilization and availability of financial resources. Efforts are under way to seek resources for these activities. There is considerable scope for generating extrabudgetary funds from Governments and non-governmental institutions for the programme. In addition to support from Governments through additional financial resources, the Initiative can also generate support for its activities through partnerships with other institutions. For example, executive training activities launched in conjunction with the programme could be supported through funds generated by the collaborating institutions. The Science, Technology and Innovation Program at the Kennedy School of Government at Harvard University is already seeking support for such activities, as part of its contribution to the initiative.

SELECTED UNCTAD PUBLICATIONS ON SCIENCE AND TECHNOLOGY

(For more information, please visit www.unctad.org/stdev on the web)

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Coalition of Resources for Information and Communication Technologies. 92 p. UNCTAD/ITE/TEB/13. Free-of-charge.

Key Issues in Biotechnology. 20 p. UNCTAD/ITE/TEB/10. Free-of-charge.

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QUESTIONNAIRE

Science and Technology Diplomacy

Concepts and Elements of a Work Programme

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