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TECHNOLOGY TRANSFER AND SCIENTIFIC AND TECHNICAL COOPERATION

COMPILATION AND SYNTHESIS OF INFORMATION ON INSTITUTIONAL, ADMINISTRATIVE, LEGILATIVE AND POLICY FRAMEWORKS THAT FACILITATE ACCESS TO AND ADAPTATION OF TECHNOLOGIES

Note by the Executive Secretary

SECOND INFORMAL DRAFT FOR REVIEW BY THE EXPERT GROUP – DO NOT QUOTE

1. Introduction

1. Article 16 of the Convention on Biological Diversity recognizes that both access to and transfer of technology among Contracting Parties are essential elements for the attainment of the objectives of the Convention, and requires that each Contracting Party undertakes to provide and/or facilitate access for and transfer to other Contracting Parties of technologies that are relevant to the conservation and sustainable use of biological diversity or make use of genetic resources and do not cause significant harm to the environment.

2. In order to develop meaningful and effective action to enhance the implementation of Articles 16 to 19 as well as related provisions of the Convention, the Conference of the Parties, by decision VII/28, adopted a programme of work on technology transfer and technological and scientific cooperation. Element 3 of the programme of work provides for the creation of enabling environments in order to foster technology transfer and technological and scientific cooperation.

3. Further to the objective of programme element 3, activity 3.1.2 of the programme of work calls upon the Executive Secretary, based on input from Parties and relevant international organizations, to compile and synthesize information, including case studies, and prepare guidance on institutional, administrative, legislative and policy frameworks that facilitate access to and adaptation of technologies in the public domain and to proprietary technologies, especially by developing countries and countries with economies in transition, and in particular, on measures and mechanisms that:

(a) Foster an enabling environment in developing and developed countries for cooperation as well as the transfer, adaptation and diffusion of relevant technologies in accordance with the needs and priorities identified by countries;

(b) Present obstacles that impede transfers of relevant technologies from developed countries;

(c) Provide, in accordance with existing international obligations, incentives to private-sector actors as well as public research institutions in developed country Parties, to encourage cooperation and transfer of technologies to developing countries, through, e.g., technology transfer programmes or joint ventures;

(d) Promote and advance priority access for Parties to the results and benefits arising from technologies based upon genetic resources provided by those Parties, in accordance with Article 19, paragraph 2 of the Convention, and to promote the effective participation in related technological research by those Parties;

(e) Promote innovative approaches and means of technology transfer and cooperation such as Type 2 partnerships, in accordance with the outcome of the World Summit on Sustainable Development, or transfer among actors, involving in particular the private sector and civil society organizations.

4. By paragraph 7 of its decision VII/29, the Conference of the Parties (COP) requested the Executive Secretary to establish an expert group on technology transfer and scientific and technical cooperation, which shall assist, through electronic consultations and long-distance communications as well as through meetings in conjunction with the informal advisory committee of the clearing-house mechanism, in the preparation of proposals on options to apply the measures and mechanisms enumerated in the previous paragraph.

5. Further to these requests, the Secretariat send notifications 32/2004 and 52/2004 on 30 April and 11 June 2004 respectively, inviting Parties and relevant international organizations to *inter alia* submit any information on the frameworks as well as measures and mechanisms described above. Reminders were sent on 23 September 2004 by notification 78/2004 and 79/2004. As of 1 April 2005, the following Parties submitted pertinent information: Canada, China, Czech Republic, European Community, Germany and the Islamic Republic of Iran. In addition, information was received and used from the following international organizations: bioDevelopments International Institute, the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), the Global Environment Facility (GEF), the Task Force on Science and Technology of the United Nations Millennium Project, the United Nations Environment Programme, the United Nations Forum on Forests, the United Nations Framework Convention on Climate Change, the United Nations University, the World Conservation Monitoring Centre (UNEP-WCMC) and the World Trade Organization (WTO).

6. The present note provides a synthesis of pertinent information as requested in activity 3.1.2 of the programme of work. It shall serve as a basis for the development of proposals or guidance on institutional, administrative, legislative and policy frameworks that facilitate access to and adaptation of technologies in the public domain and to proprietary technologies, as requested by the Conference of the Parties in the programme of work.

7. In light of the limited number of submissions received from Parties, the secretariat collected additional information, including case studies, prepared by governments, multilateral organizations and the private sector. Relevant information from the thematic reports on transfer of technology and technology cooperation as well as other relevant national reports submitted by Parties was also taken into consideration in the preparation of this note. This additional information is accessible on the provisional webpages on technology transfer of the clearing house mechanism of the Convention (www.biodiv.org),

which were established in accordance with activity 2.1.1 of the programme of work on technology transfer and technological and scientific cooperation.

8. A first draft of the document was reviewed by the expert group on technology transfer and scientific and technical cooperation, by way of electronic consultations.

2. Measures and mechanisms that foster an enabling environment for cooperation as well as the transfer, adaptation and diffusion of relevant technologies

Activity 3.1.2 of the programme of work calls for the compilation and synthesis of information, including case studies, on institutional, administrative, legislative and policy frameworks that facilitate access to and adaptation of technologies in the public domain and to proprietary technologies, especially by developing countries and countries with economies in transition, and in particular, inter alia, on measures and mechanisms that foster an enabling environment in developing and developed countries for cooperation as well as the transfer, adaptation and diffusion of relevant technologies in accordance with the needs and priorities identified by countries.

General considerations

9. According to the preamble of element three of the programme of work, creating enabling environments refers to activities of Governments at national and international levels that aim to create an institutional, administrative, legislative and policy environment conducive to private and public sector technology transfer and to the adaptation of transferred technology and that aim to remove technical, legislative and administrative barriers to technology transfer and technology adaptation, inconsistent with international law.

10. Conceptually, such activities can be distinguished according to whether they focus on fostering the *provision* of technologies or on the *reception, adaptation and diffusion* of technologies. While many countries may be mainly providing or mainly receiving technologies, it has to be borne in mind that individual countries may sometimes simultaneously provide and receive technologies from abroad. Hence, this distinction should not be misconceived to necessarily imply a differentiation into provider and recipient countries. The preamble of programme element three recognizes that enabling environments are necessary in both developed and developing countries as a tool to promote and facilitate the successful and sustainable transfer of technologies for the purpose of the Convention on Biological Diversity.

11. As explained in paragraph 1 above, the Convention identifies a specific set of technologies as being of relevance to the Convention, namely, technologies that are relevant to the conservation and sustainable use of biological diversity or make use of genetic resources and do not cause significant harm to the environment. As regards *the conservation and sustainable use of biodiversity*, relevant technologies may include "soft" technologies, such as management techniques for *in-situ* conservation (for instance integrated pest management) or technologies related to the sustainable management of biodiversity resources (for instance sustainable forest management or integrated water management). They may also include "hard" technologies, such as those used in *ex-situ* conservation (for instance, preservation and storage technologies used in gene banks). 1 In addition, many monitoring technologies (for instance, remote sensing) are key for updated and accurate biodiversity information, which is the very basis for policy-making. As regards technologies that make use of genetic resources, many modern biotechnologies will fall into this category. In this connection, there is a clear connection between Article 16, on technology transfer, and Article 19, on the handling of biotechnology and the distribution of its benefits, which will be addressed in section 5 below.

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1/ For the distinction between hard and soft tech, see the discussions provided in document UNEP/CBD/SBSTTA/9/7, paragraph 19.

12. The preamble already points to a number of relevant elements on which pertinent government activities may focus, *inter alia*: national institutions for research and technology innovation; legal and institutional underpinnings of technology markets both at national and international levels; and legislative institutions that introduce codes and standards, reduce environmental risk and protect intellectual property rights.

13. Governments are key actors in fostering an enabling environment for technology transfer and technical and scientific cooperation. However, their activities needs to be supplemented by activities of, and being undertaken in coordination with, other actors such as *inter alia* the private sector, governments, indigenous and local communities, bilateral and multilateral institutions, funding institutions, non-governmental organizations and academic and research institutions. Governments may set a broad institutional, administrative, legislative and/or policy framework, or use means such as incentives measures to create an environment conducive to technology transfer and adaptation, but these other actors are also important in, for instance, providing financial resources, increasing capacities, providing training and disseminating information. Moreover, high levels of awareness, motivation and empowerment within the public and private sectors and in civil society will help ensure that people, communities and societies are able to adapt continuously to new circumstances and technologies.

14. The close cooperation with the private sector is particularly important in light of Article 16 (4) of the Convention, which prescribes that each Contracting Party shall take legislative, administrative or policy measures, as appropriate, with the aim that the private sector facilitates access to, joint development and transfer of technology for conservation and sustainable use or that make use of genetic resources and does not cause significant harm to the environment, for the benefit of both governmental institutions and the private sector in developing countries.

Guidance developed or under development in relevant international processes

15. In addition to activities at national or regional levels, international processes and institutions will also play an important role in fostering an enabling environment for technology transfer and technical and scientific cooperation.

16. Many technologies of relevance to the conservation and sustainable use of biological diversity may also belong to the category of environmentally sound technologies. For such technologies, important international policy guidance is already provided in chapter 34 of Agenda 21, 2/ on the transfer of environmentally sound technology, cooperation and capacity-building. This chapter explains the basis for action and spells out objectives, activities and means of implementation. The Commission for Sustainable Development set up an Ad Hoc Working Group on Technology Transfer and Cooperation. The Group identified inadequate financial resources and shortage of suitably trained manpower and appropriate institutions as major difficulties in technology transfer, recommended ways to facilitate the transfer of technologies in the public sector, and also recognized the crucial role of the private sector in the transfer of technology. Subsequent reports produced for the Commission in 1995 and 1996 elaborated on this theme, and proposed activities by Governments that would contribute to the dissemination of information, capacity-building and institutional development, financial mechanisms, and partnership arrangements. 3/

2/ *Report of the United Nations Conference on Environment and Development, Rio de Janeiro, 3-14 June 1992* (United Nations publication, Sales No. E.93.I.8 and corrigenda), vol. I, resolution 1, annex II. See also http://www.un.org/esa/sustdev/agenda21chapter34.htm.

3/ See also paragraphs 105-106 of the Plan of Implementation of the World Summit on Sustainable Development, which make reference to chapter 34 of Agenda 21.

17. With regard to technology that makes use of genetic resources, international policy guidance was provided in chapter 16 of Agenda 21, on the environmentally sound management of biotechnology. 4/ This chapter identifies, for different programme areas, the basis for action, objectives, activities and means of implementation. The programme areas include: increasing the availability of food, feed and renewable raw materials; improving human health; enhancing protection of the environment; enhancing safety and developing international mechanisms for cooperation; and establishing mechanisms for the development and the environmentally sound application of biotechnology. Technology transfer is an important component of the envisaged activities. 5/

18. As regard guidance on enabling environments more specifically, the Inter-governmental Panel on Climate Change (IPCC) identified 10 dimensions of enabling environments for technology transfer in the context of the United Nations Framework Convention on Climate Change (UNFCCC): (i) National systems of innovation; (ii) Human and institutional capacity; (iii) Sustainable markets; (iv) National legal institutions; (v) Macroeconomic policy framework; (vi) Social infrastructure and participatory approaches; (vii) Codes, standards and certification; (viii) Equity considerations; (ix) Rights to productive resources; and (x) Research and technology development. 6/ These elements are also be of relevance for creating enabling environments to promote and facilitate the transfer of technologies for the purpose of the Convention on Biological Diversity, and will be taken into consideration accordingly below.

19. As regards technologies that make use of genetic resources in the context of Article 19 of the Convention, the work of the Open-ended Working Group on Access and Benefit Sharing of the Convention is also relevant. This group at its third meeting, held in Bangkok, Thailand, on 14 – 18 February 2005, initiated negotiations of an international regime on access to genetic resources and benefit-sharing with the aim of adopting an instrument/instruments to effectively implement the provisions of Article 15 and Article 8(j) of the Convention and the three objectives of the Convention. There seems to be a linkage to Article 19 (2), on the handling of biotechnologies and distribution of benefits, which calls upon Parties to take all practicable measures to promote and advance priority access on a fair and equitable basis by Contracting Parties, especially developing countries, to the results and benefits arising from biotechnologies based upon genetic resources provided by those Parties. They are hence relevant to item (d) of activity 3.1.2 of the programme of work on technology transfer and scientific and technical cooperation, spelt out in paragraph 3 above. This issue will be further addressed in section 5 below.

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Macroeconomic conditions, general institutional and policy frameworks

20. It is often underlined that a number of macro-economic policy conditions play an important role in fostering technology transfer. These conditions are particularly relevant for the transfer of proprietary technology. The use of proprietary technology is often closely linked to the production and flow of commercial goods and services; hence, it is asserted that macro-economic conditions that contribute to a growing demand for these goods and services will also stimulate the transfer of associated technology. Conditions frequently referred to include: low inflation, stable and realistic exchange and interest rates, pricing that reflects the true (marginal and fully internalised) costs of material, energy, labour and other inputs, deregulation, free movement of capital, operation of competitive markets, minimum market sizes, open trade policies and transparent foreign investment policies as well as political stability.7/ Hence, economic policies that contribute to achieve such conditions will also foster the transfer of associated technology.

4/ As per footnote 2. See also http://www.un.org/esa/sustdev/agenda21chapter16.htm

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5/ See paragraphs 16.6 (d), 16.7 (c), 16.18, 16.25 (c), 16.38, and 16.39.

6/ See UNFCCC (2003), page 9.

7/ See UNEP-IETC (2003), page 49.

21. Importantly, such policies are not only relevant on the receiving end of technology transfer. When taken on the providing end, they may for instance increase the demand for certain imported goods and services, which, in turn, may increase the demand for production technologies that are necessary to meet the increased demand. Consider, as a stylized example, more open trade policies by a country that typically provides technology. Such trade policies may also increase its domestic demand for goods and services that are imported from countries that typically receive technologies. To increase production accordingly, these countries may increase their demand for relevant production technologies from abroad.

22. The dominant mechanism for technology transfer to developing countries is foreign direct investment (FDI), accounting for more than 60% of the flow of technology to these countries.8/ Multinational enterprises – the main drivers of FDI – are powerful and effective means to disseminate technology from developed to developing countries, and are often the only source of new and innovative technologies that are usually not available through the market. Technology disseminated through FDI generally includes the 'entire package' including experts, skills and the financial resources to exploit the technology appropriately.9/ In addition, it usually implies the long term involvement of the investor. FDI can also contribute to technology transfer through on-the-job training and various forms of interaction among local and foreign firms. Backward and forward linkages favour technological diffusion, as technologically advanced foreign affiliates help their local suppliers and host country firms involved in the production process to adopt new technologies and raise quality and service standards.10/

23. The ability of the domestic investment regime to reduce the risks and transaction costs associated with investment and trade will have an impact on investment and trade patterns and the types of technologies selected. It has been asserted that to the extent that domestic legal institutions are deficient in managing the risks associated with the transfer of technology, perverse incentives will be generated that distort technology choices and supporting financial flows in ways that discourage rapid international diffusion of environmentally sound technologies. 11/

24. According to the Organisation for Economic Co-operation and Development (OECD), attention needs in particular to be given to the broader policy and institutional frameworks for investment, including public and corporate governance as well as institutional and administrative transparency. These frameworks need to ensure that administrative processes will not impose prohibitive transaction costs through tedious procedures relating to, for instance, licensing, tariff setting, and foreign exchange controls on investors. Procedures for technology-related risk assessments provide other examples. While they are needed to ensure that transferred technologies are economically viable, socially acceptable and environmentally friendly, these procedures, in order to not unduly hinder technology transfer, also need to be predictable and speedy, and should seek to minimize the administrative burdens that are put on prospective users and providers. 12/

25. Such macro-economic conditions, and the associated policies and legal frameworks to implement these conditions, are conducive to technology transfer in general. However, by their rather general nature, they are not specifically geared towards technologies of relevance for the Convention, that is, technologies for conservation and sustainable use of biodiversity or that make use of genetic resources and do not cause significant harm to the environment. Hence, while the implementation of such

8/ See UNEP/CBD/MYPOW/5, page 8.
9/ See OECD (2001).
10/ See WTO (2002), page 17.
11/ See IPCC (2001).
12/ See OECD (2002), page 5, and the related discussion in UNEP/CBD/MYPOW/5, page 9. See also paragraph 57.

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conditions will be necessary to foster technology transfer in general, they are arguably not sufficient to foster in particular the transfer of technology in accordance with Articles 16 to 19 of the Convention.

Legal, regulatory and policy frameworks pertaining to biodiversity

26. The bottom line for private enterprises and financial institutions to embark on investments in developing countries is their economic viability. However, investments in technologies for conservation and sustainable use of biodiversity, in sectors such as water management, coastal zone management, mountain management, forestry or fishery, generally do not offer high or competitive returns to investors when market conditions are left unchanged. 13/

27. Against this background, it is often argued that one of the main reasons for low demand for environmentally sound technology is a poor or absent regulatory and policy framework for environmental protection. 14/ Stronger regulations and policies can be effective instruments in promoting demand for environmentally sound technologies at the receiving end, including technologies for conservation and sustainable use of biodiversity. The improved enforcement of plans for biodiversity conservation and sustainable use, formulated as part of national strategies, could increase the cost of non-compliance and also strengthen the demand for these technologies. 15/

28. Governments can also promote the application of standards for environmental performance and create awareness about products, processes and services that use biodiversity-sound technologies through means such as eco-labelling, product standards and codes. 16/ International initiatives can provide technical support in the effective implementation of global standards and procedures set out in multilateral environment agreements. For instance, one example of the innovative approaches that CITES is using to achieve technology transfer and cooperation is the interactive computer-based training for Customs and other border control officers. 17/

29. In addition to stronger regulations and policies pertaining to conservation and sustainable use of biodiversity, other elements of domestic law are also relevant. For instance, the legal provisions that regulate land tenure have an important impact on biodiversity-related technology choices and associated transfer. Technology choices by land users will *inter alia* depend on who owns, controls and manages the resources both legally and in practice. Insecurity created by unclear property rights or conflicting claims (e.g., state ownership vs. traditional rights) deter investment. For instance, a case from Thailand shows that farmers were more likely to make capital and technical improvements on their holdings if their land ownership was secure. 18/

30. Again, such policies are not only relevant on the receiving end of technology transfer, but also on the providing end. A strong, focused and well-enforced regulatory and policy framework for environmental protection in general, and for the conservation and sustainable use of biodiversity in particular, will promote the development and improvement of technologies that help to implement the policy targets set out in the framework in a more effective and/or cost-efficient manner. Technology development, however, is a crucial precondition for technology transfer. In fact, taking the leadership in the development and implementation of such a regulatory and policy framework may eventually lead to technological leadership.

13/ See UNFF (2003), pages 13-14.
14/ ibid, page 20.
15/ ibid, page 49.
16/ For example, it has been reported that within the Asia-Pacific region, the ISO 14000 standard is now recognized as an instrument for a successful Agenda 21 implementation. See UNFCCC (2003), page 19.
17/ Communication from CITES.
18/ See IPCC (2001), ibid.

1. The acquisition of new technologies for sustainable use and conservation of biodiversity is also constrained by limited access to capital as small-scale loan facilities as well as seed capital. The high upfront costs and long pay-back periods that are sometimes associated with conservation and sustainable use technologies may also represent impediments in an environment where access to funding is restricted. Government programmes that focus on alleviating these financial constraints and improve access to capital markets, through for instance the bundling of projects or the provision of collateral and/or performance guarantees. will therefore be other important elements of the enabling environment. International cooperation and funding, in partnership with financial institutions, will be key for the effective implementation of such programmes.

Intellectual property rights

Intellectual property rights are an important aspect of enabling environments for the transfer of proprietary technology. While a substantial number of technologies for conservation and sustainable use will be of a proprietary nature, this will in particular be true for most technologies that make use of genetic resources. As was already explained in earlier documentation, 19/ on the one hand, it is often argued that strong domestic intellectual property rights regimes encourage technology transfer, by reassuring owners of proprietary technology that their rights will be protected, and by generating incentives for research and the development of new technology 20/ On the other hand, it has also been asserted that (i) a strong intellectual property rights regime is not a sufficient precondition for improving the incentives for private companies to engage in the transfer of such technologies, as a number of other economic conditions also have to be met, and that (ii) for a number of reasons, stronger intellectual-property-rights regimes may actually impede technology transfer, in particular to developing countries. This claim is based on a number of arguments:

(a) While a strong intellectual-property-rights regime might arguably generate incentives on the side of the owner of such technology to actively search for opportunities for transferring such technology through licensing, governments and local investors in developing countries may simply not have the resources to pay related fees;

(b) Moreover, depending on the intricacies of the patenting system, it may substantially increase transaction costs for prospective users and thus erect potential barriers for technology transfer; 21/

i. First, different institutions or companies may have different views on the value of a proprietary technology and the related fees to pay. Negotiations over access to technology can belong and complicated, imposing delays and administrative costs;

ii. Second, the proliferation of patents in biotechnology may lead to the need to negotiate multiple licenses when engaging in the development of specific product lines. Such patent thickets, and the subsequent stacking of royalties, may raise both transaction costs and the ultimate cost of the product, possibly leading to a “tragedy of the anti-commons”; 22/

iii. Third, the so-called reach-through claims, that is, patents for research tools that claim royalty payments on any product that was developed by using this tool,

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19/ See the discussions provided in documents UNEP/CBD/MYPOW/5 and UNEP/CBD/SBSTTA/9/7.

20/ See Lesser, W. (1997), page 8; WTO (1996), pages 4-5.

21/ See for further discussion OECD (2002): *Genetic Inventions, Intellectual Property Rights and Licensing Practices. Evidence and Politics*. OECD, Paris, and The Royal Society (2003): *Keeping science open; the effects of intellectual property rights on the conduct of science*. http://www.royalsoc.ac.uk/files/statfiles/document-221.pdf.

22/ This term was coined by Heller, M. and R. Eisenberg (1998): “Can Patents Deter Innovation? The Anticommons in Biomedical Research”. *Science 280*, 698-701

may also contribute to increased product development costs and may therefore negatively affect technology transfer;

iv. And last but not least, blocking patents or overly broad patents are sometimes feared to discourage the use of related technologies and, if granted on early, foundational discoveries, to slow the pace of research and development in a particular field;

31. Importantly, it may be the prospect alone to face prohibitive license fees and/or transaction costs that may already have a chilling effect on potential users to put sufficient efforts into the identification of transfer opportunities. As a result, such transfer opportunities may only be imperfectly identified.

32. A recent expert workshop organized by the Organisation for Economic Co-operation and Development (OECD) Working Party on Biotechnology concluded that, while the obstacles imposed by these mechanisms are sometimes substantial, actors such as firms, Governments and civil society in OECD countries are rapidly reorganizing their approaches to dealing with intellectual property rights protection, and often find pragmatic solutions to the problems enumerated above. 23/ However, it appears to be less clear whether and to what extent this finding also applies to the relevant actors in the developing world, which typically operate under more severe constraints in terms of legal expertise and capacity. Furthermore, even while it seems natural that rational actors respond to a changing legal and institutional environment, this does not imply that the resulting state of the world, from an economic perspective, is the most efficient one. Hence, further research is warranted to assess the importance and the scope of the potential obstacles enumerated above in developing countries, and possible remedial action.

33. Activity 3.1.1 of the programme of work on technology transfer and technological and scientific cooperation calls for the preparation of technical studies that further explore and analyse the role of intellectual property rights in technology transfer in the context of the Convention on Biological Diversity and identify options to increase synergy and overcome barriers to technology transfer and cooperation, consistent with paragraph 44 of the Johannesburg Plan of Implementation, by taking the costs and benefits of intellectual property rights fully into consideration. At the time of preparation this note, work on the preparation of such a study, undertaken by the CBD Secretariat, UNCTAD and WIPO, was still ongoing.

34. Several intellectual-property-rights-related mechanisms for the sharing of benefits may provide important avenues for the diffusion in particular of biotechnologies. Examples include joint patents with stakeholders in countries of origin of genetic resources as well as joint research programmes with institutions in such countries. 24/ Such intellectual property rights-mechanisms would seem to have a large potential to play a significant role in north-south technology transfer. Countries could engage in adapting their legal, regulatory and policy frameworks to encourage the use of such mechanisms.

35. The literature provides some proposals on other concrete measures and mechanisms for intellectual property management that could foster the transfer of technologies of relevance to the Convention, and in particular of biotechnologies:

- *Patent Pools and intellectual property management services*
  A patent pool is a voluntary agreement between two or more patent owners to license one or more of their patents to one another or third parties. For example, the Public Intellectual Property Resource for Agriculture (PIPRA) 25/ is an collaborative initiative of U.S universities and public research institutions to bundle their licensed and un-licensed technologies (“shared technology

23/ See OECD (2002), *ibid*.

24/ See the Bonn Guidelines for Access and Benefit-sharing, paragraph 43 and annex II.

25/ See http://www.pipra.org.

packages"), making them more readily available to member institutions for commercial licensing or for designated humanitarian or special use. As part of this effort, a database of patented agricultural technologies is being developed to inform researchers on freedom-to-operate obstacles at the initiation of their research. 26/ For developing countries, patent pools may be important because companies can more easily obtain the licenses required to practice a particular technology, which reduces transaction costs and facilitates the rapid deployment of new applications.27/

- *National technology transfer offices*
  A centralized service at the national level that can facilitate external negotiations and provide support to domestic institutions that lack the needed skills. These technology transfer offices could also support the harmonization of material transfer agreements among public organizations in order to reduce transaction costs of transferring intellectual property. For example, Indonesia has established a central office for technology transfer to help negotiate access to technologies of value to Indonesian agricultural research programmes. 28/ However, it is also said that one risk of centralization is the potential to create another bureaucratic hurdle for scientists. 29/

- *Intellectual property commercialization agents*
  For example, BTG Ltd. (formerly known as the British Technology Group) is an institution that is dedicated to the profitable commercialization of third party intellectual property in the fields of health, medicine, and other biotechnologies. 30/ Clients include public research centers and global technology companies, from start-ups to multinational companies. It functions as a retainer for technology innovators, charging fees and sharing in revenues generated from its services, and provides a mechanism to turn intellectual property into competitive and cost-effective products, especially into the public sector health care sector of developing countries.31/

Strengthening of domestic research and innovation systems

Human capacity development and training

36. The strengthening of domestic research capacities is an important element of an enabling environment for technology transfer and adaptation. The national research and innovation system plays a key role in the development of technology, in the identification of technology transfer opportunities and in the provision of practical research to adapt important technologies to local socio-economic conditions – a key precondition for successful technology transfer.

37. Public research institutions can also pay special attention to innovation for sustainable development, that is, to the development of technologies with social and environmental benefits that cannot be captured through the market mechanisms alone. 32/

38. However, many developing countries face severe constraints in national scientific capacity, including a lack of a critical mass of well-trained scientists, technicians and engineers, required to generate scientific and technological innovation as well as to adapt and absorb technologies. Correspondingly, many activities geared towards the strengthening of national research systems are related to capacity building and include the training of staff at all levels as well as the enhancement of technical and

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26/ See Krattiger (2004), page 21.
27/ Ibid, page 29.
28/ See Byerlee and Fischer (2000), p. 21.
29/ ibid
30/ See www.btgplc.com.
31/ See Krattiger (2004), page 26.
32/ UNFF (2003b), page 49.

institutional capacity. On the global level, the United Nations University (UNU) provides a multitude of pertinent training activities. 33

39. On the providing end, a strong national research and innovation system will drive the process of technology development – a necessary precondition for any transfer. On the receiving end, research institutions that are located within the importing country will often be closer to local stakeholders and technology users and their wealth of indispensable information for successful dissemination and adaptation of technology. Fostering cooperation among research institutions in developed and developing countries is an important activity undertaken by a number of countries. Denmark for example runs a programme to enhance the research capacity of developing countries by financing twinning arrangements between research institutions in these countries and its own research institutions. 34/ Canada reports that it supports international collaboration for Canadian research institutions in emerging high-growth areas of *inter alia* environmental technologies and genomics. It further supports local scientists, people and institutions, to identify income-generating strategies and appropriate production technologies for the sustainable use of the products of biodiversity, such as medicinal plants and non-timber products in developing countries. 35/

Research consortia

40. Individual public research organizations in small and medium-sized developing countries are at a comparative disadvantage in accessing biotechnology products due to substantial economies of size in biotechnology research, small market size, and their weak bargaining position with respect to large private companies.

41. However, public research institutions within the same region will often have similar goals, needs and assets, which is an incentive to pool resources. As a consortium they might be in a better position to gain access to technologies if they negotiate as a group and also could share the costs. Such a consortium could also enhance the sharing of biotechnology tools and germplasm products among the public research institutions. Regional collaboration is already occurring through programmes such as the Asian Rice Biotechnology Network (ARBN) or the Latin American Biotechnology Network (REDBIO). It is underlined that, in order to be effective, these consortia should have a legal basis and a strong but small central unit to negotiate and possibly hold intellectual property on behalf of its members. 36/

Public-private cooperation and intermediary institutions

42. The domestic research and innovation system also plays a key role in a country's absorptive capacity in relation to technology. One problem related in particular to public research in developing and developed countries alike is that relevant research findings do not reach the potential users, or only insufficiently so. Correspondingly, it is often asserted that government-to-government cooperation mechanisms could be more effective in facilitating the flow of technologies to the potential final users in developing countries. There is a great need to enhance the interaction between institutions of education and training as well as of research and development on the one side and local industries on the other. 37/ The conclusion is that, to the extent feasible, the private sector should be involved in such cooperation either as a direct beneficiary or as a potential intermediary, which would "package" and distribute research findings to the final users. 38/

33/ See the communication from the United Nations University for details.

34/ See IP/C/W/132/Add. 4

35/ See the Thematic Report on Technology Transfer and Cooperation from Canada.

36/ See Byerlee and Fischer (2000), p. 22.

37/ See WTO (2003), page 94; UNFCCC (2003), page 16.

38/ See UNFF (2003b) page 33.

43. However, alliances and joint ventures between the public and private sector often face difficulties due to differences in business cultures, the lack of experience with intellectual property management in public organizations, and asymmetric negotiation skills and experiences. Intermediary institutions are often said to play a useful role in acting as a "honest broker", which focuses on creating public-private-partnerships by facilitating fact-based negotiations of transfer agreements, providing "managed" technology transfer, and providing access to financing facilities. 39/ Many of the already existing alliances have been brokered through intermediary organizations such as the Agricultural Biotechnology Support Program (ABSP) and the International Service for the Acquisition of Agri-biotech Applications (ISAAA), for instance, the Pioneer and Applied Genetic Engineering Research Institute (AGERI) alliance in Egypt. 40/

44. In the context of the CBD, a suitable institution could be identified at the national level which, in close cooperation with National Focal Points for the Convention and the National Focal Points of the clearing house mechanism, could act as a central consulting point on technology access and transfer for other national or international actors to turn to. This institution could act as a central gateway for the exchange of pertinent technology-related information, that is, on needs and opportunities for the transfer and adaptation of technology as well as on related capacity needs and the support available, through for instance national and international training programmes and initiatives, in building or enhancing capacities. For instance, relevant actors in developing countries, both on the providing and the receiving end, may often not have the experience, and the expertise gained thereby, of negotiating technology transfer agreements which are often legally complex. Acting as a central technology transfer office for purposes of the Convention, the envisaged institution could for instance organize related capacity building for these actors, assist them in the negotiations and/or negotiate, as appropriate under the circumstances of the individual countries, on their behalf. 41

45. On the international level, the International Service for the Acquisition of Agri-biotech Applications (ISAAA) operates primarily as a facilitator, matching available technologies to meet identified needs, brokering technologies, and building capacity by transferring knowledge and know-how between companies in developed countries and the public sector in developing countries. ISAAA also addresses other constraints in biotechnology transfer, such as regulatory and public perception issues. According to Krattiger (2004), this concept is appropriate to chart new territory and bring public and private actors closer together. It is also effective in setting new models of collaboration specific to geographic areas, technologies, industry types, or needs. However, it also demands complex institutional arrangements and significant funding. 42/

46. The Consultative Group on International Agricultural Research (CGIAR) is another important network on the international level. It consists of a strategic alliance of countries, international and regional organizations, and private foundations supporting 15 international agricultural centres worldwide that work with national agricultural research systems and civil society organizations including the private sector. CGIAR is committed to strengthening national agricultural research in developing countries through side-by-side working relationships with colleagues in national programs, strengthening skills in research administration and management, and formal training programs for research staff. CGIAR is a potentially important "bridge" between advanced private and public research organizations and public research organizations in developing countries. 43

39/ See UNFF (2003b): page 49; Krattiger (2004), ibid, page 28.

40/ See Byerlee and Fischer (2000), p. 19.

41/ See the related discussion in paragraph 35 above.

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42/ See Krattiger (2004), page 28.

43/ Regional organizations such as for instance the European Federation of Biotechnology (www.efb-central.org) could also be play that role of an intermediary.

47. An interesting suggestion for a global initiative was recently made by a report to the United Nations prepared in the context of the Millennium Development Goals. The report states that biotechnology could save tens of millions of lives each year in developing countries if the technology is shared equitably. The study is part of the six-million-dollar Canadian Programme on Genomics and Global Health, funded by the Canadian government as well as two pharmaceutical companies, Merck & Co. and GlaxoSmithKline. The report *inter alia* calls for the creation of a Global Genomic Initative (GGI), to promote the potential of genomics and to help transfer technology and basic science. This initiative would link various stakeholders and make information on latest technologies freely available, so that developing countries could use those resources to develop their own solutions to local problems.44/

48. Another option to support in particular developing countries in the conclusion of technology transfer agreements would consist in the compilation of standard templates for such agreements, used for instance by the institutions referenced in the previous paragraphs. This compilation and analysis, which could be undertaken by the Secretariat to the Convention in cooperation with the aforementioned institutions and initiatives, could be used to develop international guidance that could act as reference for good/best practice on technology transfer agreements.

49. Promoting the exchange of technology-related information at national, regional and international levels, in particular on technology needs and technologies that are available for transfer, is recognized as a key enabling mechanism that would facilitate the transfer of relevant technology under the Convention. In fact, the particular importance of information exchange is highlighted by the programme of work on technology transfer and scientific and technical cooperation by focusing on this issue in an own programme element, on information systems. Activity 2.1.2 under this programme element foresees the development of proposals to enhance the clearing house mechanism of the Convention as a key mechanism for exchange of information on technologies and for facilitating and promoting technology transfer and cooperation. Draft proposals thereon will be discussed by the informal advisory committee on the clearing house mechanism in conjunction with the expert group on technology transfer and scientific and technical cooperation, and will be submitted to the Conference of the Parties at its eighth meeting as a separate document.

50. Experience at the national level seems to highlight the important role of personal contacts for the successful identification of transfer opportunities and the successful conclusion of the transfer. Web-based platforms may be an important tool, but will need to be supplemented by other matchmaking mechanisms. For instance, matchmaking could also be facilitated by the Parties to the Convention through national or regional workshops that would bring together technology providers and users.

3. Measures and mechanisms that present obstacles for technology transfer

51. Activity 3.1.2 of the programme of work also calls for the compilation and synthesis of information on measures and mechanisms that present obstacles that impede transfers of relevant technologies from developed countries.

General observations

52. Many of the crucial elements of an enabling environment for technology transfer that were enumerated and discussed under section 2 above, are, as of today, not implemented in a satisfactory manner. Hence, the absence or poor implementation of these elements can be interpreted as creating obstacles that impede transfer of relevant technology from developed countries. Examples would include: the existence of deficient investment regimes and weak domestic policies and regulations, negative

44/ *Genomics and Global Health*, commissioned by the Millennium Project of the United Nations, released 8 October 2004.

effects of intellectual property law, etc. To avoid duplication, the following discussion will not re-iterate these elements.

53. Other obstacles transpire from other elements of the programme of work on technology transfer and scientific and technical cooperation, namely, from the programme elements on needs assessments and on national, regional and international information systems.45/ A general lack of awareness and information on technology needs as well as on available technology and ongoing capacity development initiatives to foster the transfer of these technologies, is often cited as a major barrier to technology transfer. Again, to avoid duplication with activities under these other programme elements, the following paragraphs will not further elaborate on these aspects.

54. Poor technical, scientific, institutional and administrative capacity will be in many countries another important obstacle for the effective transfer, diffusion and adaptation of technology as well as technical and scientific cooperation. This is an issue of cross-cutting importance, that is, the absence of adequate capacity will present obstacles to the effective conduct of needs assessments and to the improvement of national information systems for technology transfer, referred to in the paragraph above, and will also present a key obstacle for the creation of an adequate enabling environment for technology transfer. The building and enhancement of such capacity is covered in element four of the programme of work.

Trade related obstacles

General observations

55. In many countries, barriers to trade constitute an obstacle for the effective transfer of technology. This is particularly the case where barriers affect the import of technology-intensive goods, and in particular machinery and equipment. It may be objected that, under a knowledge-based definition of technology, which also includes "soft" technology in form of technological knowledge and information, 46/ the mere sale to or purchase of equipment and machinery would not qualify as an effective transfer of technology. 47/ However, it has also to be borne in mind that the import of technologically-intensive machinery and equipment usually comes as a package which also includes the transfer of pertinent technological information and know-how, through manuals, training, long term cooperation between importers and exporters, etc. 48/

56. The World Trade Report 2003 shows that, for all technology categories, tariffs on technology products tend to be higher in countries at a lower stage of development. In addition, while for low-technology goods import duties in low-income countries are on average 3.4 times higher than they are in high-income countries, for high-technology goods they are 8.5 times higher. That is, unlike technology transfer would require, the degree of protection in low-income countries is relatively higher for high-technology products. 49/

57. As regards potential non-tariff barriers, one has to bear in mind that there is also a need identified in the programme of work on technology transfer and scientific and technical cooperation to ensure that

45/ Programme elements one and two of the programme of work on technology transfer and technological and technical cooperation as contained in the annex of decision VII/29.

46/ See the explanations provided in UNEP/CBD/MYPOW/5, paragraph 15, and UNEP/CBD/SBSTTA/9/7, paragraph 19.

47/ Accordingly, the UNCTAD Draft Code of Conduct on the Transfer of Technology defined 'transfer of technology' as *"the transfer of systematic knowledge for the manufacture of a good, for the application of a process or for the rendering of a service and odes not extend to the transactions involving the mere sale or purchase of goods."* See Yusuf, Abdulqawi A. (2001), page 319.

48/ See Yusuf, Abdulqawi A. (2001), page 319.

49/ WTO (2003), page 94.

transferred technologies are economically viable, socially acceptable and environmentally friendly. 50/ The need is of particular relevance in the case of modern biotechnology that could for instance add value to the biological resources of many developing countries. 51/ Legal and administrative frameworks need to be in place to conduct appropriate technology risk assessments, to transform their results into decision-making, and to implement the decisions. These frameworks need to be effective while not unduly restricting the transfer of technologies that are relevant under the Convention.

Tariff and non-tariff barriers to environmental goods and services

58. In paragraph 31 (iii) of the Doha Ministerial Declaration, trade ministers at the fourth session of the WTO Ministerial Conference, held in Doha, Qatar, on 9 –14 November 2001, agreed, with a view to enhancing the mutual supportiveness of trade and environment, to negotiations on the reduction or, as appropriate, elimination of tariff and non-tariff barriers to environmental goods and services. Such goods may also include technology-intensive goods of relevance to the Convention. Hence, the negotiations have the potential to remove or alleviate an important obstacle to the effective implementation of Article 16 of the Convention.

59. The negotiations on paragraph 31 (iii) of the Doha Declaration were assigned to the negotiating group on non-agricultural market access (NAMA), with an examination of definitional aspects and scope of environmental goods and services, as well as a monitoring role over progress, given to the WTO Committee on Trade and Environment in Special Session. Delegates identified a number of complex technical questions pertaining in particular to the definition of environmental goods. Some of these problems are also relevant for the identification of technologies for conservation and sustainable use of biodiversity, such as:

v. the multiple end-use problem, that is, the fact that some goods might be used for environmental or for other purposes, including environmentally harmful ones. For instance, night-vision goggles could be used by park services in their fight against poachers, but they may also be useful for more effective poaching;

vi. the "moving target" problem, alluding to the question how to keep preferential lists updated in light of ever-evolving goods and technologies;

vii. how to avoid a bias towards "end-of-pipe" technologies as they are easier to identify than integrated technologies for cleaner production, or for reducing and/or avoiding harm to biodiversity;

viii. how to address goods and services whose positive environmental impact is dependent on the target region; for instance, knowledge related to the sustainable management of ecosystem resources will often be applicable to specific ecosystems, climatic regions, agricultural production systems etc., but not to others.

60. This negotiations are however not only relevant for fostering the *direct* transfer of goods that may encapsulate technology of relevance to the Convention. Analogously to the reasoning provided in paragraph 21 above, the elimination of tariff and non-tariff barriers by developed countries for certain biodiversity-based goods from developing countries could foster the demand for these goods and, subsequently, the demand in those developing countries for technology for the sustainable use of the underlying biodiversity assets.

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50/ See element one of the programme of work.

51/ See also paragraph 47.

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Export control policies

61. Another mechanism that could possibly present an impediment to the transfer of technologies of relevance to the Convention has recently been pointed out by the Sunshine Project 52/, a non-profit association that works on issues related to biological weapons. This association has raised the concern that the current international system of export controls could be an obstacle to the transfer of technologies of relevance to the Convention. Export controls are national legal and administrative systems designed to limit or to prohibit transfer of certain types of technology, and specifically equipment, materials and knowledge that have potential weapons uses. At the international level, an informal association of 34 member countries, the so-called Australia Group, develops common control lists of technologies and works to ensure that export controls are harmonized among members. The Sunshine project states that export controls, possibly working in conjunction with domestic patent secrecy provisions, may restrict the transfer of many biological technologies that, in addition to being potentially weapons-related, could also be relevant to the objectives of the Convention. For example, export controlled items such as biological manufacturing technologies and basic laboratory safety equipment, may as well be used in medicine, agriculture, and other industries. 53/

62. The Sunshine Project underlines that the number of export denials imposed each year cannot be determined, because such information is not publicly available. Because of these information constraints, it is very difficult to gauge at this stage whether and to what extent export controls present obstacles that impede the transfer of technologies of relevance to the CBD. It is noteworthy in this context that none of the submitted thematic reports on technology transfer and technological cooperation identified export controls as a constraint for the transfer of technologies of relevance to the Convention. 54/ The Center for Non-proliferation Studies of the Monterey Institute of International Studies, located in Washington, DC, USA, is currently undertaking a research project that focuses on the effects of export controls on the development in industrializing countries.

4. Measures and mechanisms that provide incentives to private-sector actors and public research institutions in developed countries

63. Activity 3.1.2 of the programme of work also calls for the compilation and synthesis of information on measures and mechanisms that provide, in accordance with existing international obligations, incentives to private-sector actors and public research institutions in developed countries to encourage cooperation and transfer of technologies through e.g., joint ventures or technology transfer programs.

General remarks

64. The provision of incentive measures is an important element of an enabling environment in particular for the transfer of proprietary technologies. For such technologies, governments have by definition only limited, if any, force in directly regulating or prescribing their transfer. Accordingly, many governments in developed countries are undertaking activities by developing legal and financial instruments and adapting tax regimes that incite and reward technology transfer. This section provides an overview on these activities under different categories of incentive measures.

65. Article 66.2 of the TRIPS Agreement also requires "*developed country Members to provide incentives to enterprises and institutions in their territories for the purpose of promoting and encouraging technology transfer to least-developed country Members in order to enable them to create a*

52/ See http://www.sunshine-project.org

53/ See Sunshine Project (2004): *Export Controls: Impediments to Technology Transfer Under the Convention on Biological Diversity*, Backgrounder #13.

54/ See the thematic reports on Technology Transfer and Cooperation.

sound and viable technological base." 55/ Further to this requirement, developed country Members are required to provide reports on their pertinent activities to the World Trade Organization. Insofar as being pertinent for fostering the transfer of technology of relevance under the Convention, the following section also synthesizes the information provided in these reports.

Incentives to private sector actors

Incentives provided by bilateral development cooperation

66. An analysis of the thematic reports on technology transfer and technological cooperation, as well as of recent submissions provided by Parties to the Convention56 shows that incentives to private sector actors to engage in technological cooperation and technology transfer are often provided in the framework of bilateral development cooperation. In particular:

- **Austria** pointed to a new co-financing instrument for development cooperation for private business partnerships, which allows macro small and medium-sized enterprises from developing countries to cooperate with Austrian companies to implement projects in their home countries.
- In **Belgium**, the Belgian Science Policy Office finances bilateral cooperation projects and finances the Belgian contribution to GBIF, which includes a capacity-building component. The 'Belgian Coordinated Collection of Micro-organisms' (BCCM) provides capacity building for micro-organisms. Since June 2000, the Plant Biotechnology Institute for Developing Countries (IPBO, University of Ghent) is active in training, technology transfer and plant biotechnology research. 57/
- The **Czech Republic** provided a comprehensive overview of official development cooperation activities undertaken in competence of the Ministry for the Environment, a number of which include the transfer and adaptation of technology of relevance to the Convention., for instance, the implementation of biological pest control technology.
- **Canada** indicated that the Environment Canada's Environmental Technology Advancement Directorate supported the development and application of environmental technologies in Canada and around the world. Canada also has other systems and incentives in place to facilitate cooperation between research institutions and the private sector and developing countries, and supports this type of work through its bilateral aid programme, such as the Canadian International Development Agency RADARSAT programme. Project with a strong technology transfer component include: the National Water Quality and Availability Management program in Egypt, Water Harvesting and institutional strengthening in Tigray (WHIST), Ethiopia; the Sustainable Agriculture project between Canada and China aimed at promoting environmentally sustainable agriculture practices in the Inner Mongolian Autonomous Region; and the Hebei Dryland project. 58
- **China** reported that within the framework of China-Africa Cooperation Forum, Chinese private companies were encouraged to provide funds, technical support and training to some African countries in various fields, including biodiversity conservation and sustainable use. China also encourages private companies to establish joint ventures with foreign companies in the development and application of technologies for conservation and sustainable use of natural resources.

55/ See IP/C/28, Implementation of Article 66.2 of the TRIPS Agreement.

56/ See the thematic reports on Technology Transfer and Cooperation from Austria, Canada, China, Finland, Germany, Japan, Norway, Spain, Switzerland, as well as the submissions on technology transfer from Canada, the Czech Republic, the European Communities (with information from Belgium, Germany,

57/ http://www.ipbo.ugent.be .

58/ Submission from the Government of Canada.

- **Finland** indicated that some Finnish private companies had been providing technical assistance to some developing countries in the conservation, management and sustainable use of biodiversity, including through implementing some Finnish development cooperation projects.
- **Germany** reported that since 1999, the German body responsible for technical cooperation (GTZ) had been supporting private companies' long-term activities in developing countries through Public-Private Partnerships. In addition to providing funds, training of local staff and technology transfer are typical elements of the projects under the Public-Private Partnerships, most of which deal with natural resources management and sustainable use of biodiversity. One concrete initiative with a strong technology component is the German Appropriate Technology Exchange (GATE). 59/ GATE's objectives are to improve the technological competence of NGOs and other groups involved in self-help-oriented poverty alleviation and to develop information and knowledge management systems for NGOs and self-help groups.
- **Japan** provided some details concerning training courses, which JICA had delivered to various countries in 2001 in the fields of forestry, agriculture and coastal resources.
- **Norway** indicated that it had a number of programmes that encourage private sectors, research institutions and non-governmental organizations to undertake technological cooperation with developing countries, though most of them do not directly address biodiversity or environmental issues alone. NORAD funds the development of environmental technologies and also works with the Norwegian Export Council to encourage the private sector to undertake technology cooperation and transfer through the "*Match-making Programm*e".
- **Spain** reported that various programmes existed to facilitate private-sector collaboration with developing countries, including collaboration with public institutions of the developing countries, as exemplified by the work of the Center for Industrial Technological Development.
- **Switzerland** has a number of programmes to encourage private sector, research institutes and non-governmental organizations to be involved in the development and transfer of technologies for the benefit of developing countries and countries with economies in transition. One of the projects funded by the Swiss Agency for Development and Cooperation is the Southern African Drought and Low Fertility Project, which is designed to help the members of the Southern African Development Community (SADC) develop maize germplasm with tolerance to drought and low soil fertility and improve maize yields and yield stability under conditions typical for resource-poor farmers. The other is the Indo-Swiss Collaboration in Biotechnology, which focuses on areas of agriculture and environment.

Fiscal incentive measures

67. Incentives for the private sector such as tax concessions, refunds or deferrals for R&D investments and relating them to the commercialization of technology are often implemented with a view to enhance the transfer of technology.60/

68. In addition, the tax systems of many countries foresee tax breaks or deferrals for charitable activities. It has been proposed that the related legal frameworks could be adapted to provide adequate incentives for private companies to engage in the transfer of relevant technologies and related capacity-building activities. Such provisions would be of particular importance if, as provided in Article 16(2) of the Convention, access to and transfer of technology shall be provided and/or facilitated including on concessional or preferential terms.

69. Such measures could also be used to generate incentives for private sector actors that engage in research making use of genetic resources to implement adequate mechanisms for the promotion and advancement of priority access to the results and benefits arising from the biotechnologies that result

59/ http://www.gtz.de/gate

60/ See Byerlee & Fischer, 2000, p. 21.

from such research, in accordance with Article 19(2) of the Convention. Guidelines for eligibility to research-oriented tax breaks or deferrals could be adapted to reflect the pertinent provisions and guidance of the Convention. They could also encourage the broad access to research tools (through free access or non-exclusive licenses), joint patents with stakeholders in countries of origin of genetic resources, joint research programmes with institutions in such countries, and discourage reach-through provisions. 61/

70. Importantly, tax incentives may not only be provided on the providing side, but also on the receiving side. For instance, pertinent legislation in Brazil states that a company that ensures the access to and transfer of technology to a Brazilian institution, public or private, and invests in research and development in Brazil, shall be able to apply for fiscal incentives for technological capacity building of industry and agriculture and for other incentive instruments, in accordance with the relevant legislation. 62/

Other direct financial incentive measures

71. Other financial incentive measures include the direct support of the export of certain technology-intensive goods. For instance, the Netherlands established a programme that seeks to facilitate the transfer of climate-friendly technologies to developing countries by subsidizing the purchase of climate-friendly technology from the Netherlands up to 60% of the costs (e.g. energy-efficient city busses have been transferred to Ethiopia, and windmills to China and India). 63/ Such programmes would also be applicable to technologies of relevance under the Convention.

72. Moreover, several countries have programmes in place to offer subsidized export credits or loan guarantees that act as insurance against risks in international transactions in order to encourage private companies to engage in high-risk export markets. This insurance constitutes an incentive for technology transfer in that it provides a certain amount of security for operations abroad and is offered by many countries *inter alia* Belgium, Germany, United Kingdom, Norway and the Netherlands.64/ Guidelines for eligibility for such programmes could be adapted to provide incentives to such companies to engage in technology transfer for the purpose of the Convention on Biological Diversity, in a manner consistent with international obligations.

73. Several developed countries also provide financial support for the set-up of long-term and mutually binding technological cooperation between private firms in developed and developing countries, and by co-financing local businesses with little or no access to long-term investment capital. Such support, which is for example provided by Denmark, Germany and Norway, 65/ could also be applied to technological cooperation of relevance to the Convention.

Non-monetary incentive measures for cooperation and capacity building

74. A number of countries established programmes that seek to facilitate information sharing and personal contacts between private sector technology producers and potential users of these technologies. For example, the Danish “Danida’s PS Programme” provides incentives to Danish companies in the form of advisory services and support in identifying partners, study visits and examinations as well as the provision of information on technology transfer and the need to adapt and apply new technology to

61/ See OECD (2002) for a related discussion of the guidelines of the United States National Institutes of Health (USNIH).

62/ See Provisional Act No. 2,186-16, Art. 23 2001.

63/ See UNFCCC (2003), page 20.

64/ See IP/C/W/132/Add.4/Suppl.1, IP/C/W/132/Add.4/Suppl.2, IP/C/W/132/Add. 4

65/ See IP/C/W/132/Add.4/Suppl.1, IP/C/W/132/Add.4, IP/C/W/412/Add.4, and the thematic report on technology transfer and cooperation from Norway.

developing countries.66/ So-called match-making programmes are offered *inter alia* by Norway and Switzerland.67/ They seek to encourage private partnerships by promoting investment projects between private firms in OECD countries and counterparts in developing and transition countries. Such promotion could for instance take place by facilitating the negotiations on partnership agreements.68

Incentives to public research institutions

75. Public research institutions are almost by definition mainly or exclusively funded by public monies. It therefore appears that public authorities have more leverage on the terms of reference that govern research undertaken by public institutions, when compared with the research undertaken by private sector actors. The principles and guidelines that govern the funding of these institutions could be further developed to reflect the pertinent provisions and guidance of the Convention on technology transfer. In line with what had been observed in paragraph 69 above, such updated guidelines could in particular apply to public research institutions that engage in research making use of genetic resources. The guidelines could foresee the implementation of adequate mechanisms for the promotion and advancement of priority access to the results and benefits arising from the biotechnologies that result from such research, in accordance with Article 19(2) of the Convention, and could also encourage the broad access to research tools (through free access or non-exclusive licenses), joint patents with stakeholders in countries of origin of genetic resources, joint research programmes with institutions in such countries, and discourage reach-through provisions. 69/

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76. In many countries however this comparatively high degree of leverage will nevertheless be restricted by a number of important factors, including: (i) the high value assigned to the policy principle that governments should not interfere with research and science (freedom for research and science); and (ii) the fact that budgetary restrictions have led many governments to put public research institutions under increasing pressure to look for private co-funding and for commercialization of their research results. In such cases, the approach outlined in the previous paragraph could be usefully complemented by the types on incentive measures provided to private sector actors, as described in the previous sub-section.

5. Measures and mechanism that promote and advance priority access to the results and benefits arising from technologies based upon genetic resources, and to promote the effective participation in related technological research

77. Activity 3.1.2 of the programme of work also calls for the compilation and synthesis of information on measures and mechanisms that promote and advance priority access for Parties to the results and benefits arising from technologies based upon genetic resources provided by those Parties, in accordance with Article 19, paragraph 2 of the Convention, and to promote the effective participation in related technological research by those Parties.

General observations

78. Article 19, on handling of biotechnology and distribution of its benefits, requires Parties to the Convention to take legislative, administrative or policy measures, as appropriate, to provide for the effective participation in biotechnological research activities of those Parties, especially developing countries, which provide the genetic resources for such research; and to take all practicable measures to promote and advance priority access by such Parties, on a fair and equitable basis, to the results and benefits arising from biotechnologies based upon the genetic resources provided.

66/ See IP/C/W/132/Add. 4.

67/ See IP/C/W/412/Add.2.

68/ See also paragraph 43 on intermediate institutions.

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69/ See again OECD (2002), ibid, for a related discussion of the guidelines of the United States National Institutes of Health (USNIH).

79. In the context of providing priority access, on a fair and equitable basis, to the benefits arising from biotechnologies based upon genetic resources, there is a linkage to the ongoing negotiations on an international regime on access to genetic resources and benefit-sharing with the aim of adopting an instrument/instruments to effectively implement the provisions of Article 15 and Article 8(j) of the Convention and the three objectives of the Convention, which are taking place in the Open-ended Working Group on Access and Benefit Sharing of the Convention. Article 1 of the Convention, which presents its three objectives, recognizes that the appropriate transfer of relevant technologies is one means to achieve the fair and equitable sharing of the benefits arising out of the utilization of genetic resources. 70 The transfer of technology as a non-monetary means to share benefits arising from the utilization of genetic resources is also recognized in the Bonn Guidelines on Access and Benefit-sharing that the. 71/

80. In the context of implementing Article 19 of the Convention, it may also be useful to consider that the development of technologies that are based on genetic resources may also utilize, during the development process, traditional knowledge that is associated with the genetic resources.

National legislation and guidelines

81. Legislation in a number of countries addresses access and benefit-sharing and provide for the establishment of guidelines or regulations. Several of these guidelines or regulations have already been adopted (e.g. Costa Rica, India, Malawi), while others are in draft form or in planning stage. 72/

82. Different types of actors may use genetic resources, ranging from universities, research institutes, gene banks, botanical gardens to biotechnological companies. There is frequently a need identified for different mechanisms that reflect the type of user and his objectives, needs and priorities when accessing genetic resources, including for instance the intended uses of the genetic resources, such as basic research or potential commercialization. For example, the South African Biodiversity Act requires different measures depending on whether the genetic resources are being accessed for research or for commercial purposes.73/

83. Brazil states in its Provisional Act No. 2, 186-16, Article 21 that "the institution that receives samples of genetic heritage components or associated traditional knowledge shall facilitate the access to and transfer of technology for the conservation and use of this heritage or of this knowledge to the Brazilian institution responsible for the access and shipment of the samples and transmission of the knowledge, or to an institution it indicates." It specifies further in Article 22 that "the access to and transfer of technology between a Brazilian research and development institution, public or private, and a foreign-based institution, may be carried out through the following activities, among others: 1.) Scientific research and technological development, 2.) Training and capacity building of human resources, 3.) Exchange of information, 4.) Exchange between a Brazilian research institution and a foreign-based research institution, 5.) Consolidation of scientific research and technological development infrastructure, 6.) Economic use, in partnership, of process and product arising from the use of a genetic heritage component, and 7.) Establishment of joint technologically based undertaking."

84. The type of actor involved is therefore likely to have an influence on the benefit-sharing arrangement. For instance, benefits from an agreement involving a private company are more likely to

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70/ Article 1 of the Convention states that: *"The objectives of this Convention, to be pursued in accordance with its relevant provisions, are (…) the fair and equitable sharing of the benefits arising out of the utilization of genetic resources, including by appropriate access to genetic resources and* ***by appropriate transfer of relevant technologies****, taking into account all rights over those resources and to technologies, and by appropriate funding."* (emphasis added)

71/ See Appendix II, paragraph 2 (f).

72/ See UNEP/CBD/WG-ABS/3/2.

73/ See South Africa National Environmental Management: Biodiversity Act, 2004, art. 83-84

include royalties in the event of commercialization, some kind of up-front payment and possibly non-monetary benefits like training or transfer of technologies, while benefits arising out of resources collected by, for instance, botanical gardens with the sole purpose of realizing academic research, are likely to rather involve non-monetary benefits, such as (i) technology transfer, (ii) joint fieldwork and research, or (iii) provision of internships and training. It has to be in borne in mind however, that even purely academic research may (unintentionally) lead to results that can be commercialized.

85. According to a recent publication 74/ "almost without exception, every biodiversity-prospecting collection effort undertaken on behalf of companies is done through intermediaries". These intermediaries are mainly botanic gardens, research institutions and universities with expertise in collection techniques, taxonomy and other relevant fields. It has been suggested that the importance of such intermediaries may need to be considered by governments in the development of their access and benefit-sharing regimes.75/

86. A number of measures and mechanisms that were discussed in previous sections will also contribute to promote and advance priority access for Parties to the results and benefits arising from technologies based upon genetic resources provided by those Parties, in accordance with Article 19(2) of the Convention. For instance, it was discussed in section 4 above how incentives could be generated for private sector actors (paragraph 69) and public research institutions (paragraph 75) to engage in pertinent activities, through the development or revision of guidelines that govern eligibility for tax breaks or deferrals, or for funding.

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Information exchange and development of guidance at the international level

87. In addition, reference was also made to the importance of identifying or establishing suitable national institutions that could inter alia promote the enhancement of capacity or, as appropriate, the enhanced use of existing expertise in the negotiation of technology transfer agreements for the sake of benefit sharing in accordance with Article 19 (see the discussion in paragraph 44 above). A compilation and analysis of existing templates or standard transfer agreements, envisaged in paragraph 48 above, and the subsequent development of international guidance thereon, could also contribute to enhance the capacity of in particular developing countries in this regard.

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Project-based activities

88. The literature, the thematic reports and the recent submissions provide information on a number of project-based activities that promote access for Parties to the results and benefits arising from technologies based upon genetic resources provided by those Parties:

- One successful project concerning the effective participation in biotechnological research activities is a joint venture between the multi national company Dupont and the Applied Genetic Engineering Research Institute (AGERI), an Egyptian public research institute. The project aims to jointly develop Bt maize, whereas AGERI gains access to expertise to develop the local strain of Bt (the innovation) and to train its staff. Dupont in turn, has access to the new Bt strain for use in markets outside of Egypt. 76/
- Austria reported on a research project on sweet potato germplasm diversity assessment, under which unlimited use of all results for the CGIAR system and partners in developing countries is ensured. Moreover, it has drafted a proposal of a Virtual Training Center for Capacity Building (VTCCB) in cooperation with CGIAR centres and the international capacity programme on conservation and use of biological diversity for development, between the International Plant

74/ See Laird (2002).

75/ See UNEP/CBD/WG-ABS/3/2.

76/ Beyerlee and Fischer (2000).

Genetic Resources Institute (IPGRI) and the Austrian Federal Ministry of Agriculture, Forestry, Environment and Water Management. 77/

- The United Kingdom reports that the training of developing country scientists in the application of new technologies for the conservation and utilization of genetic resources takes place in various institutions including universities, Kew, the John Innes Centre in Norwich and CABI (an intergovernmental organization that obtains competitive public funding). The commercial company of the Macaulay Institute has undertaken training of Chinese scientists in nature conservation and range management. In combination with Institutes in several Central Asian countries, new systems of production, which conserve biodiversity of rangelands, have been developed. Current work in South America is developing systems with local organizations for the sustainable management of vicunas.

6. Measures and mechanisms that promote innovative approaches and means of technology transfer and cooperation such as Type 2 partnerships

89. Activity 3.1.2 of the programme of work also calls for the compilation and synthesis of information on measures and mechanisms that promote innovative approaches and means of technology transfer and cooperation such as Type 2 partnerships, in accordance with the outcome of the World Summit on Sustainable Development, or transfer among actors, involving in particular the private sector and civil society organizations.

General remarks

90. Partnerships can achieve many of the 10 dimensions of enabling environments described in paragraph **Error! Reference source not found.** above, particularly in terms of joint R&D and human and institutional capacity development. Case studies reflect that partnerships involving a broad range of actors ranging from universities and R&D institutions to government entities, private companies and NGO's are important for enhancing technology transfer.

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91. The partnerships can take on diverse forms and involve a range of players. Private sector participants can include technology developers, assessors, suppliers, users and investors, while those from the public sector might be central government departments, agencies, intergovernmental organizations and local government. Networks can usefully bring together players who play similar roles in the technology transfer process, and wish to share experiences and information through the exchange of best practices, lessons learned and case studies as well as protocols, criteria, benchmarks and performance data on specific technologies.

Type 2 Partnerships

92. One important outcome of the World Summit on Sustainable Development (WSSD) have been so called Type 2 partnerships. Those are voluntary multi-stakeholder initiatives that are specifically linked to the implementation of commitments outlined in the Johannesburg Plan of Implementation, Agenda 21 and/or the Programme for the Further Implementation of Agenda 21.78/ It is the partners themselves that govern the partnerships through a mutually agreed mechanism. The governance mechanisms may vary from partnership to partnership but could be built along the lines of existing other partnerships like the Global Alliance on Vaccine and Immunization (GAVI), the Consultative Group on International Agricultural Research (CGIAR), or the International AIDS Vaccine Initiative (IAVI). Type 2 partnerships require no formal selection process and interested parties can get together and launch implementation initiatives to achieve the goals of sustainable development.

77/ Thematic report on technology transfer and cooperation from Austria.

78/ E/CN.17/2004/16, page 3

93. The distribution of registered partnerships by thematic focus shows that some areas have very few registered partnerships. These "underrepresented" thematic areas include *inter alia*: biotechnology, desertification, drought, marine resources and mountains.

94. One partnership that relates to technologies of relevance to the Convention is an initiative involving the International Centre for Genetic Engineering and Biotechnology (ICGEB, Italy) to promote sustainable biotechnology and agriculture in Africa. 79/ This initiative pursues *inter alia* (i) the protection and exploitation of genetic resources; (ii) the identification of research priorities; (iii) procedures for risk assessment and management, national legislation(s) and public information. Results of the research performed in the national institutes will be transferred, on a favourable basis, to other countries participating in the initiative.

International partnerships, networks and joint R&D programmes

95. A number of networks have been active in sensitizing the private sector in the developed world to sustainable business options in the developing world. In addition to Type 2 partnerships, several new partnerships were launched at the WSSD including *inter alia* the UNDP-GEF Technology Transfer Network and UNEP's Global Network on Energy for Sustainable Development. The former addresses the issue of access to knowledge by facilitating information exchange, finance and investment in sustainable products and services *inter alia* in the agriculture, water and forestry sectors, while the latter is focusing on various thematic areas of energy, including renewables and access to the poor. 80/

96. Another partnership initiative is the World Business Council for Sustainable Development (WBCSD), a coalition of 170 international companies with the commitment to sustainable development via economic growth, ecological balance and social progress. The WBCSD's key activities include *inter alia* capacity building, climate, water, energy and sustainable livelihoods. 81/ One example of a WBCSD partnership activity is a cooperative timber supply program called the Forestry Partners Program82/ developed by Aracruz Celulose 83/ in 1990. Under this program, partnerships are formed with local farmers to develop new, sustainable timber plantations that provide alternative planted sources of timber for the company's pulp mill, and a new source of income for the farmers and local communities. In addition, seedlings of native tree species are also provided for use in protected reserves. The program aims to help local farmers earn a better living, make better use of under-productive and fallow land, and benefit from a viable and profitable alternative to traditional crops by supplying know-how and partial financing.

97. Yet another example of a global partnership is the international research cooperation network in the area of science and technology (CYTED), which links 21 Spanish- and Portuguese-speaking countries from Europe and Latin America. This programme, which is supported by several international organizations, involves different models of cooperation between universities, R&D centres and enterprises. Its primary objective is to establish cooperation in research and technology development and the transfer of R&D results to the productive sector. It includes sectoral activities relevant to areas such as energy conservation and biodiversity. 84/

98. The Climate Technology Initiative (CTI) launched in 1995 is a voluntary initiative by 23 OECD/IEA member countries and the European Commission to support the technology-related objectives of the

79/ http://webapps01.un.org/dsd/partnerships/search/partnerships/22.html
80/ See UNFCCC (2003)
81/ See http://www.wbcsd.ch
82/ See http://www.wbcsd.ch/Plugins/DocSearch/details.
83/ See http://www.aracruz.com
84/ See UNFCCC TP/2003, page 21

UNFCCC. It generally aims at facilitating the more rapid development and diffusion of climate-friendly technologies and practices through partnerships among OECD countries, developing countries, multilateral organizations and the private sector. 85/ Synergies with the objectives of the Convention on Biological Diversity may in particular result from the work of the CTI on technologies for adaptation to climate change.

Public Private Partnerships

99. The establishment of partnerships involving public and private key players brings complementary capacities and helps to share advantages and to gain mutual benefits. One increasingly important example of such relationships is public-private partnerships. These are being seen increasingly as an effective means to leverage public funds, thereby overcoming budget restrictions, while also harnessing the efficiency of the private sector and allowing it to operate more effectively through changes in public policy that create more business opportunities. For the private sector, it is increased business opportunities for providing better products, better services and sustainable technologies that also matters. Through effective and equal partnerships, the advantages of the private sector are combined with the social responsibility, local knowledge, environmental awareness and job generation concerns of local or national governments.86/ The public and private sectors bring specific skills and assets that often provide the potential for alliances that exploit complementarities.

100. Assets of the private sector include large research and development resources to fund long-term projects; a diverse range of organizations from small biotechnology companies to large multinational companies that have extensive and increasingly collaborative research links with the public sector, particularly universities; dynamism, managerial efficiency, entrepreneurial spirit, knowledge of, and expertise in, marketing and distribution systems; knowledge of technologies; access to global financial markets; and the advantages of economies of scale.

101. The public sector can provide the private sector with knowledge of pathways for local market access, applied infrastructure and access to local genetic resources. Furthermore, partnerships with the public sector are likely to improve the public image of biotechnology and of the private company involved.

102. However, it is important that public and private partners recognize the differences in their values and culture. Considerable time and patience is needed to bridge these cultural divides and establish mutual trust and confidence. The overall goal should be to build partnerships that optimize the comparative advantages of the public and private sectors to achieve mutual objectives.

103. It has been pointed out that joint ventures and co-operations between governments and firms may prove useful not only in channeling concrete private investments into technology but may also contribute to alter other firms' risk perceptions in the medium and in the long run, thus contributing to an increasing and more stable private sector involvement. 87/ With regard to the transfer of technology of relevance under the Convention, this observation may also be relevant with regard to technology risk assessments that are needed, according to the programme of work on technology transfer and scientific and technological information, to ensure that the transferred technologies are economically viable, socially acceptable and environmentally friendly. 88 Conducting technology transfer within partnership agreements will ensure that these objectives are duly taken into account from the very first stages of the transfer process, and will thus also contribute to stabilize the expectations of the involved businesses. In

85/ See UNFCCC (2003), page 21

86/ See UNEP-IETC (2004).

87/ See UNFCCC (1999).

88/ See programme element 1, preamble and activity 1.2.1.

addition, partnership agreements provide scope for reducing the general political and economic risks associated with foreign direct investment, and are therefore preferred to FDI when these risks are relevant. 89/

104. Technology partnership programs can be fostered in conditions where government institutions as well as science and technology centers are sufficiently strong to form a mutually beneficial partnership with private enterprises. While these partnerships should eventually develop and operate independently, public sector support is often necessary to establish the basic framework for collaboration. 90/ Examples of such partnership programs of relevance for technology transfer under the Convention include:

- Technology partnership programs such as the UK Technology Partnership Initiative (TPI), a government initiative that aims to link companies and organizations in developing countries with UK companies and other organizations, which provide both technologies and services, as well as the information and advice they need to deal with their environmental problems. 91/
- Public private partnership programmes such as offered by the *Deutsche Investitions- und Entwicklungsgesellschaft* (DEG German investment and development society) that aim to provide structural support to the private sector in countries that are developing or undergoing reform. DEG supports specifically target business partnerships between German (or other EU) investors and local firms in developing countries and cofinances pre-investment and investment-tied projects. These include projects to protect the environment including the support of training schemes, such as the qualification of suppliers. 92/ An example is the DEG-backed German-Egyptian joint venture ATOS that developed a pilot project, in which plants are cultivated and seeding and harvesting times as well as extraction procedures are tested. 93/
- Several CGIAR centres have developed joint-ventures with private companies. 94/

105. Public-private partnerships may also play an important role in the development of innovative funding mechanisms for technology transfer. As explained in paragraph 1 above, banks and other lending institutions seem at present to be reluctant to finance the transfer and uptake of technologies for conservation and sustainable use of biodiversity. This issue can be addressed through the promotion of institutions, arrangements and mechanisms that can provide innovative financing, including micro-financing, green finance, secured loans, and/or leasing arrangements.

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106. In general terms, initiatives that could be undertaken by public-private partnerships include (comprehensiveness is not claimed):

- strengthening scientific and technical education and research institutions in order to help address technology needs;
- discouraging restrictive business practices and promoting open markets and fair competition in biodiversity technology related markets, including the promotion of good practices in this regard, through for instance the development of international standards and guidelines;
- increasing the certainty and responsiveness of legal systems and reduce regulatory risk by reforming administrative law and ensuring that public regulation is accessible to stakeholders and subject to independent review;
- encouraging capital flows that support technology transfer and scientific and technological cooperation through the use of innovative specialized credit instruments and capital pools;

89/ See WTO (2002), page 33.
90/ UNFF (2003b), page 49
91/ See thematic report on technology transfer and cooperation from the United Kingdom.
92/ http://www.deginvest.de/english/home/range_service/ppp/index.html
93/ See http://www.deginvest.de/english/home/range_service/ppp/index.html
94/ See Beyerlee and Fischer (2000), page 14.

- expanding research and development programmes aimed at improving access to technologies that are needed in developing countries and adaptable to local conditions;
- improving systems for the collection, assessment and sharing of specific technical, commercial, financial and legal information.

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