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A pre-feasibility study

**ESTABLISHMENT OF THE ESCWA TECHNOLOGY
CENTRE FOR DEVELOPMENT**



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Executive summary

In the current competitive global economy, appropriate science, technology and innovation (STI) policies have become the interface between socio-economic needs and knowledge producers, while society is becoming increasingly reliant upon technological expertise and such new institutional forms as technopoles, networks, incubators and clusters. Consequently, regions must benchmark with competitors and try to keep a competitive edge. Implementation of STI policies is dependant on education, training, recruitment, research and development (R&D) and cooperation, which is the central element in the development of small and medium enterprises.

The Report of the Secretary General of the United Nations on promoting the application of science and technology in order to meet the Millennium Development Goals stressed the need for and the role of technology in achieving those Goals. The need for cooperation between Arab States has been aired repeatedly in various regional forums over the past decade. In May 2005, the Economic and Social Commission for Western Asia (ESCWA) responded to the challenge by adopting resolution 254 (XXIII) concerning the establishment of the ESCWA Technology Centre (ESCWA TC) (ESCWA 2005c).

In view of the dearth of regional cooperation, coordination or synergy, the fact that ESCWA member countries are making little progress in this respect, as is reflected in the available indicators, is not surprising. STI policies must be reassessed in view of the global challenges, institutions must be upgraded and new R&D institutions created in industrial, technical and engineering domains. Furthermore, there is an acute need to create linkages between academic institutions and R&D centres, and between potential funds and those with ideas and innovative projects. There is an additional need to strengthen the demand side of technology and match it with the supply side.

The ESCWA TC will therefore focus on STI capacity-building as a tool for achieving sustainable development, enhancing growth, competitiveness, economic diversification, employment creation and poverty reduction, and addressing gender-related issues. It will also coordinate regional and sub-regional cooperation in selected areas and encourage the pooling of resources when major regional technology-based projects are being considered, because technology transfer (TT), adaptation, development and application are most effectively realized when addressed at the regional level.

The ESCWA TC will promote the acquisition and use of modern technologies with a view to attaining sustainable development objectives at the national and regional levels, and improving productivity and adherence to international quality standards, thereby increasing member country competitiveness in the knowledge-based economy. Those objectives will be achieved through strengthening the capacities of member countries to acquire, adapt and implement modern technologies and related institutional, policy and regulatory arrangements.

Universities in ESCWA member countries do not emphasize development of the entrepreneurial spirit in their curriculums. There are no technology licensing organizations that facilitate the linkages between universities and productive sectors, and it is not common for those entities to have R&D laboratories. As a result, there are no financing mechanisms to activate the linkages between the two. There is no region-wide patents organization, and no venture capital, seed capital, matching capital, angel capital, or incentives. The securing of partnerships in order to attempt to fill some of the gaps and take remedial action will constitute one of the main tasks of the ESCWA TC.

The need for a regional centre, as other regions of the world have discovered, is prompted by economic considerations. While national STI centres would need to continue to provide overall guidance and a variety of services to national bodies and enterprises, the proposed centre would seek to coordinate and harmonize selected activities from sub-regional and regional perspectives, highlighting common priority areas for groups of or, indeed, all countries. In effect, projects implemented by the ESCWA TC would always have a regional dimension, responding to multilateral concerns. They would also be designed, as far

as possible, to reduce duplication and make use of national experiences. Furthermore, the ESCWA TC portfolio of activities would be designed in such a manner as to ensure that donor organizations are presented with a more attractive proposition than a narrow national agenda, and that international cooperation is promoted in a manner that responds as fully as possible to national needs.

It is imperative that a gradual approach is adopted, because the nature of the major goals identified, namely, TT, STI policy, human resource development, awareness and promotion, are different, and so are their respective solutions. Priorities should therefore be set at an early stage. Because of the diverse nature of the ESCWA member countries, the initial focus should be on TT and awareness. Support should also be provided for “intermediary” activities, national or regional STI policies and local TT activities. Web-based information and/or brokerage services should be made available, Governments should be convinced of the importance of new STI policies and TT centres, and assistance should be given to member countries by training TT agents in national, regional or local centres. Of particular relevance will be activities geared towards policy studies, advice, the creation of new STI institutional forms, networking, the promotion of pro-poor technologies and gender issues.

A single “four walls” structure and, conversely, a virtual structure, are both deemed inadequate to satisfy the requirements of and create the necessary partnerships with ESCWA member countries. The Centre should have its physical headquarters in one of the member countries, with satellite national centres around that nucleus in other member countries, in order to be able to address thematic or specific issues in a coordinated and timely manner with the support of national focal points. The divisions and units of the Centre will operate in tandem with the satellite national centres, which have the potential to act as centres of excellence in specific domains.

The role of the focal points in member countries will be pivotal to the activities of the ESCWA TC. They will support its objective of forming linkages between all the parties concerned, namely, suppliers and users, R&D institutes, universities, production and services sectors, and ESCWA member countries. They should also help to strengthen the linkages between those countries and the region with the outside world, while strengthening endogenous capacities.

In order to sustain operations, the establishment is recommended of an endowment Fund of \$20 million, providing a return on investment of some \$1 million per annum. An initial budget of some \$3.362 million is necessary in order to cover initial costs over three years. That amount includes a start-up budget of \$757,000 for the first phase of 12 months.

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Introduction

The need to establish a technology centre stems from the under-utilization and limited development of science and technology in the region, and has been prompted by requests from member countries for such a centre to cater for national and regional needs. Attention has been repeatedly drawn to those needs in several United Nations studies and recommendations (ECOSOC 2003, 2004, 2005a, 2005b, UNEP 2004/5). The Economic and Social Commission for Asia and the Pacific (ESCAP) has helped to establish and operate a similar centre, with remarkable success, while the European Union (EU) has initiated an EU-wide debate to discuss the establishment of a European institute of technology (European Commission 2005). In January 2006, ESCAP and the Korean Government signed an accord concerning the establishment of a new technology centre in the Republic of Korea, aiming to close the digital divide in the region through targeting Millennium Development Goals (MDGs).

The ESCWA Technology Centre for Socio-economic Development will build upon and consolidate achievements related to science, technology and innovation (STI) and help to implement recent resolutions and recommendations by relevant regional and global conferences.

Box 1. Priority tasks and activities to be implemented by the ESCWA Technology Centre

- (a) To improve the balance between demand and supply aspects of science, technology and innovation (STI), taking into consideration member country priorities and the need for regional cooperation and development;
- (b) To strengthen the building blocks and linkages of the knowledge-based economy and foster networking arrangements and new institutional forms, particularly in relation to enterprise and employment creation, thereby promoting national socio-economic growth and poverty alleviation;
- (c) To promote STI awareness in both the public and the private sectors;
- (d) To implement programmes designed to formulate and/or redraft national STI policies, encouraging higher spending levels on STI initiatives, in a manner that is consistent with results-based budgetary approaches;
- (e) To provide linkages to such other global issues as the Millennium Development Goals (MDGs).

This pre-feasibility study considers the regional need to establish an ESCWA technology centre and aims to identify a model for implementation, organizational and funding strategies and potential partners.

This version of the study has been discussed by a virtual panel of experts from, inter alia, national, regional and international research and development (R&D) institutions, universities and the private sector. The enhanced draft was submitted to the ESCWA Consultative Committee on Scientific and Technological Development (ESTIC) meeting for review and recommendations in early March 2006. The final version will be submitted to the Twenty-fourth Ministerial Session of ESCWA in May 2006.

I. REGIONAL CONTEXT AND NEEDS

A. REGIONAL CONTEXT

The problems suffered by the economies of ESCWA member countries over the past few decades have included low growth rates, lack of economic diversity or manufacturing versatility and low value added. As a result, few products are exported from this region to world markets, other than natural resources or products primarily based on those natural resources. Those problems have had serious consequences for the region, including high unemployment, brain drain, capital drain and high national debt. According to modern growth theory, technology is a major factor in economic growth, and the basis of the information society and the knowledge-based economy. The ESCWA region therefore greatly needs to promote TT, adaptation, development and application.

Universities and R&D centres may be requested to participate in national and regional programmes to address those issues. However, those institutions are not necessarily linked to the economic activities of the region. They possess human and material wealth to varying degrees, and their assets have influenced the way in which they have built and supported technology development and adaptation activities (see tables 1-3 and figure 1). Their outputs vary widely in quantity, quality and orientation. Furthermore, scientometric and informetric methodologies for assessing R&D may be of limited value, because only a few research results find their way into international databases, patents and commercial applications. Additionally, the research reporting that is done may not be representative of mainstream concerns and/or may not relate to the areas of emphasis of international and national research activities being carried out in ESCWA member countries (ESCWA, 1998). In that respect, it should be noted that there is a paucity of recent and comparable official statistical data from all ESCWA member countries; the most recent is the compilation made in 2005 by ESCWA.

Both supply of and demand for science and technology (S&T) are very low, and mechanisms and linkages for the promotion of such demand are weak. The ESCWA TC will aim to promote demand for technology for accelerated socio-economic development. Its design should resemble that of the Asian and Pacific Centre for Transfer of Technology (APCTT), one of the ESCAP regional institutions, which aims to facilitate TT in the Asia-Pacific region in four main focus areas, namely, technology information, TT, techno-entrepreneurship development and innovation management.

The ESCWA TC will promote the acquisition and utilization of modern technologies with a view to attaining sustainable development objectives at the national and regional levels. Modern technologies will be targeted, with a view to improving productivity and adherence to international quality standards, thereby impacting member country competitiveness in the knowledge-based global economy. The objectives of the Centre will be achieved by strengthening capabilities of member countries to acquire, adapt, develop and implement modern technologies and related institutional, policy and regulatory arrangements (ESCWA 2001b).

TABLE 1. R&D INDICATORS FROM ESCWA MEMBER COUNTRIES

Country	Number of scientific workers/million	Patents registered in United States of America (2000-2005)
Bahrain	1.4 (1996)	5
Egypt	493 (1990-2001)	41
Iraq	0.7 (1996)	1
Jordan	270 (2003)	9
Kuwait	72.6 (2002)	32
Lebanon	0.7 (1996)	0
Palestine
Qatar	591 (1990-2001)	2
Saudi Arabia	330.5 (1996)	117
Oman	4 (1990-2001)	2
Syrian Arab Republic	29 (1990-2001)	4
United Arab Emirates	0.4 (1996)	25
Yemen	0.2 (1996)	0

Source: ESCWA, 2005d.

Note: Two dots (..) indicate that data are not available.

It should be noted that only one ESCWA member country, namely, Saudi Arabia, has prepared and formally endorsed a forward-looking STI policy and a series of five-year action plans, while others, including Egypt, Kuwait and Lebanon, are in the final stages of developing new national policies on STI. Greater emphasis should be placed on the need to identify the deficiencies of national innovation systems, particularly in relation to the institutional, policy, regulatory and legislative frameworks. If not properly addressed, such deficiencies can continue to pose major impediments to technology-based growth, no matter how much effort is spent on promoting TT, adaptation, development, application and diffusion. Appropriately formulated and implemented frameworks provide fertile ground for sustained technology-based growth and competitiveness, at the institutional and/or company and the national levels. It is imperative that STI policies should be integrated into economic five-year development plans. More needs to be done both at the policy formulation level and, more importantly, in respect of translating new policies into action.

Box 2. Excerpt of recommendations from the thirty-seventh session of the General Union of Chambers of Commerce, Industry and Agriculture for Arab Countries, 2005

- (a) To set up an Arab centre for science, technology and scientific research;
- (b) To encourage the establishment of Arab productive sectors with relevant technical capacity for competitiveness;
- (c) To repatriate from abroad Arab expertise and knowledge.

The ESCWA TC will promote capacity-building at the national level, coordinate regional and sub-regional cooperation in selected areas; and establish complementarity and synergy in STI-related activities and, in particular, in the pooling of resources when major regional technology-based projects are being considered.

The ESCWA TC will also implement activities aimed at human resource development and at sensitizing enterprises and their federations to the benefits offered by new technologies and the modalities that may be pursued for their adoption. Small- and medium-sized enterprises (SMEs) will receive special attention in their activities. ESCWA TC must showcase the most successful practices in innovation worldwide and best practices in the ESCWA region; and develop networks between research centres and industries, and between potential funders and those with ideas and projects. It must be recognized that the type of support for technology-related activities that will be provided will vary: those required by SMEs will be of a small scale and/or incremental type, involving informal or unstructured R&D or, more frequently, technological and/or technical support, while major technological innovation at the national or regional level will be of an altogether different order.

Activities will be conducted in full cooperation and partnership with regional universities, R&D institutions, and production and services sectors. Focal points will therefore be designated in selected institutions. Ideally, such institutions should possess structures similar to the ESCWA TC, in order to facilitate the creation of the required synergy and streamlined interaction.

The role of those focal points will be crucial: they will support the stated objectives of the ESCWA TC by forming the regional coordination linkages between all parties concerned, namely, suppliers and users; R&D institutes, universities and productive and services sectors; and ESCWA member countries. Additionally, they should strengthen endogenous capacities and the linkages between ESCWA member countries, the region and the outside world.

Set forth below are some of the ESCWA member country institutions that could fulfill the required roles:

- (a) King Abdulaziz City for Science and Technology (KACST) (Saudi Arabia);
- (b) Kuwait Institute for Scientific Research (KISR) (Kuwait);
- (c) National Research Centre (NRC) (Egypt);
- (d) Scientific and Applied Research Centre (SARC) (Qatar);

- (e) National Council for Scientific Research (Lebanon);
- (f) National Committee for Technology Transfer (NCTT) (Iraq);
- (g) Higher Institute of Applied Sciences and Technology (HIAST) (Syrian Arab Republic);
- (h) Higher Council for Science and Technology (HCST) (Jordan);
- (i) Supreme Council for Scientific Research (Yemen);
- (j) Centre of Excellence for Applied Research and Training (CERT) (United Arab Emirates);
- (k) Bahrain Centre for Studies and Research (BCSR) (Bahrain);
- (l) Sultan Qaboos University (Oman);
- (m) Council for Scientific Research (Palestine).

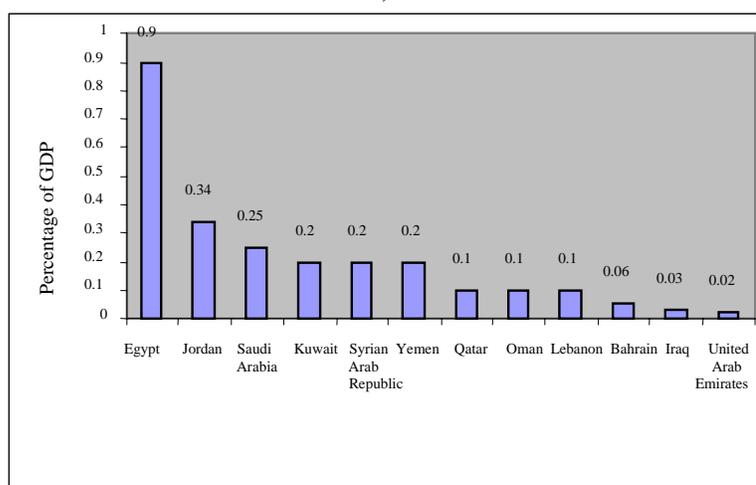
Because of the experience it has gained from activities in the field at both the national and regional levels, ESCWA is well-placed to establish the proposed TC. Furthermore, TT, adaptation, development and application are most effectively realized at the regional level.

TABLE 2. DISTRIBUTION OF R&D UNITS BY COUNTRY, 1996

Country	Autonomous and ministry-governed	Universities	Private sector	Total	Percentage of total
Egypt	48	10	6	64	27.83
Saudi Arabia	19	28	2	49	21.31
Jordan	18	3	3	24	10.43
Syrian Arab Republic	19	3	0	22	9.57
Kuwait	11	0	4	15	6.52
Iraq	12	3	0	15	6.52
Lebanon	11	0	0	11	4.78
Yemen	7	0	0	7	3.04
Qatar	0	6	0	6	2.61
Oman	6	0	0	6	2.61
United Arab Emirates	3	2	0	5	2.17
Bahrain	3	1	0	4	1.74
Palestine	2	0	0	2	0.87
Total	159	56	15	230	100
Percentage distribution	69.13	24.35	6.52	100	

Source: UNESCO 1998.

Figure 1. Ranking of ESCWA member countries by percentage of GDP allocated to R&D, 1996-2003



Source: ESCWA 2005d.

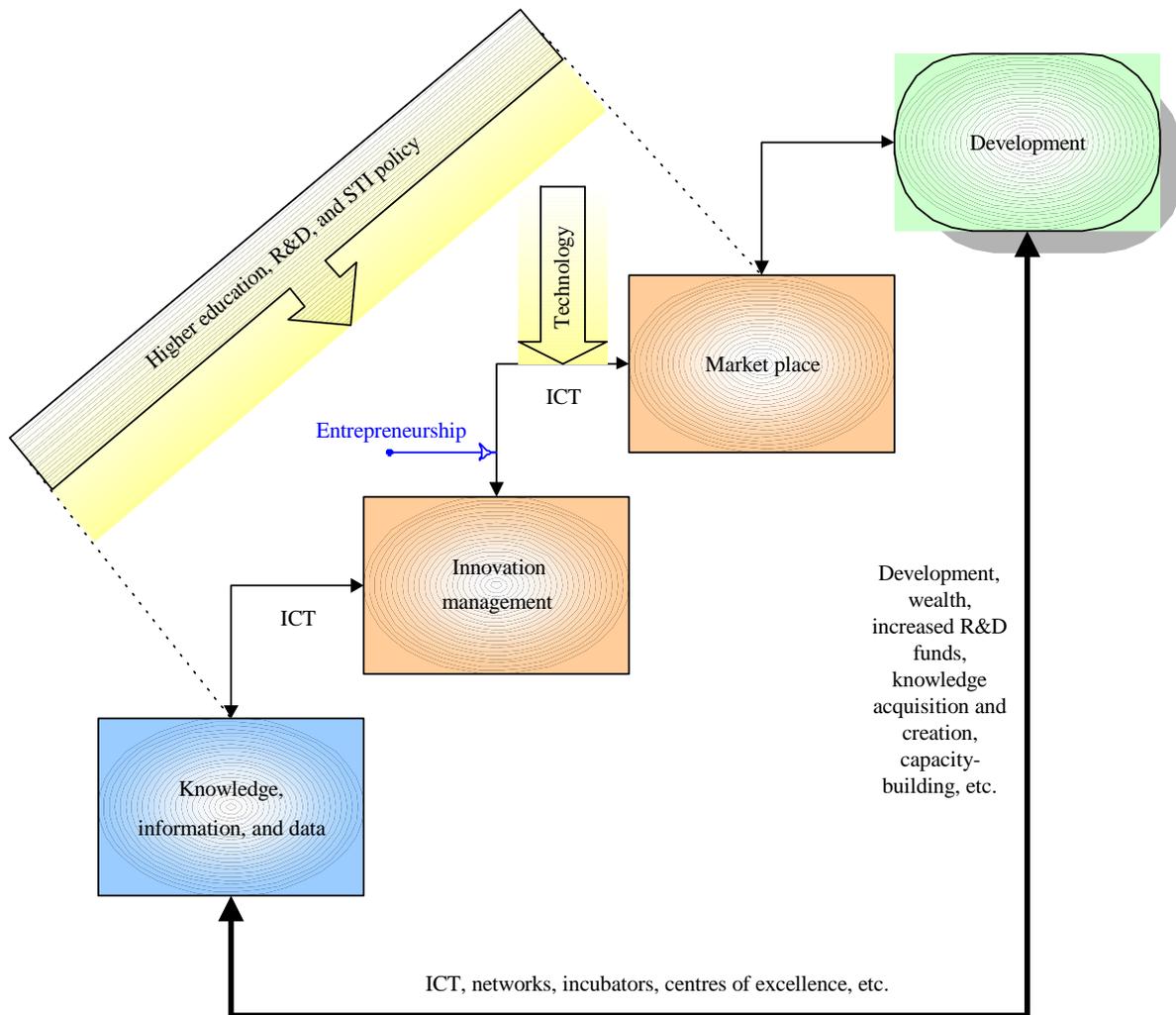
B. REGIONAL NEEDS

The lack in ESCWA member countries of a technology centre which could balance supply and demand, and the need for cooperation have been repeatedly brought up in various regional forums over the past four years (ESCWA 1998, 1999). The United Nations Development Programme (UNDP) 2003 Arab Human Development Report emphasized in chapters 3 and 5 the importance of creating regional institutes for the transfer of knowledge and in chapter 9 proposed a strategy which included the creation of such institutes.

The report of the United Nations Secretary-General on promoting the application of science and technology to meet the development goals contained in the Millennium Declaration (E/CN.16/2004/2), stressed the need for and role of technology in achieving MDGs. Similarly, several United Nations Economic and Social Council (ECOSOC) resolutions have recommended the application in developing countries of S&T in order to support development (ECOSOC 2003; 2005a; 2005b).

For the purposes of this study, the categories of need set forth below were identified for the region. They should be considered in conjunction with figure 2, which is a schematic representation of the essential building blocks and linkages of a knowledge-based economy.

Figure 2. Building blocks and linkages of a knowledge-based economy



1. *Needs on the supply side*

Indicators of the state of S&T on the supply side show important shortages. Those indicators (UNDP 2003; ESCWA 2005d; World Economic Forum 2005; World Bank 2005) including the following:

(a) Gross expenditure on research and development <0.3 per cent of gross domestic product (GDP) in Arab countries, compared to >2-3 per cent in developed countries;

(b) Twenty six research papers per million people in Arab countries (1995), compared to 42 in Brazil, 1,252 in the Netherlands and 1,878 in Switzerland;

(c) The number of patents registered in the United States of America by Arab states between 1980 and 2000, varied from 2 (Yemen) to 171 (Saudi Arabia). In the same period, South Korea registered 16,328. In the period between 2000 and 2005, the same figure for Arab countries ranged between 0 and 117;

(d) The number of scientists and engineers working in R&D per million people is less than half of the world average of some 1,000 persons;

(e) The number of S&T institutions in the Arab world is very low, particularly in fields other than medical and agricultural sciences;

(f) The number of centres specializing in industrial, technical and engineering domains is particularly low;

(g) Very few ESCWA member countries have an officially-endorsed and developed STI policy integrated into national development programmes. As a promoter of S&T research, and in view of the lack of pre-competitive STI activity in the region, the Centre will be required to foster more pre-competitive research in ESCWA member countries, while concurrently promoting synergy and complementarity in R&D and innovation activities and catalyzing region-driven activities in such specific sectors as water management, petrochemicals and textiles.

There is a definite need to promote new STI policies in ESCWA member countries, identify deficiencies in existing science policies, and formally endorse and integrate them into developmental strategies (ESCWA 2000b).

2. *Needs on the demand side*

R&D units associated with productive and service enterprises are few in number and their performance is generally below expected levels. It is estimated that there are a mere 16 such units in Arab countries, and many fewer in ESCWA member countries. Those units belong to the private sector and are concerned with industry (UNDP 2003).

In developed countries, the public and private sectors usually supply 40 and 60 per cent respectively of expenditure on R&D. In Arab countries, the private sector share is very small, reflecting the fact that the demand side of S&T in those countries is very low indeed (UNIDO 2001).

There is general appreciation of the fact that technology is a major moving force behind economic diversity, and ESCWA member countries, have stated their need and intention to diversify their economies accordingly. However, the ratio of GDP/capita for the manufacturing industries to the GDP/capita for extraction industries continues to remain very low (see table 3). Technology is not being used as a major factor in employment creation, particularly in relation to SMEs, which are designed to be the major beneficiaries of the ESCWA TC. The acute need for technology for employment creation remains to be addressed.

TABLE 3. THE RELATIVE SIZE OF THE EXTRACTION AND MANUFACTURING SECTORS
IN THE ARAB COUNTRIES

Country	Value-added of extraction industries (\$ million)	GDP/capita for extraction industries (\$) (A)	Value-added of manufacturing industries (\$ million)	GDP/capita for manufacturing industries (\$) (B)	B/A
Saudi Arabia	35 870	1 776	12 542	620	0.34
Algeria	16 569	550	3 986	132	0.24
United Arab Emirates	10 239	4 352	5 500	2 334	0.54
Libyan Arab Jamahiriya	8 402	1 576	3 455	650	0.41
Kuwait	7 796	4 309	3 009	1 660	0.38
Egypt	5 879	89	10 112	153	1.72
Oman	4 327	1 816	669	1 231	0.68
Syrian Arab Republic	4 055	264	1 723	113	0.43
Qatar	3 602	6 208	718	1 231	0.20
Yemen	976	58	629	37	0.64
Bahrain	841	1 402	788	1 308	0.93
Morocco	686	25	5 585	203	8.12
Jordan	305	48	1 197	190	3.96
Tunisia	243	26	6 066	650	25.00
Lebanon	39	15	1 538	482	32.13

Source: UNIDO 2001.

3. Needs on the demand-supply interface

The Arab Human Development Report UNDP 2003 noted that Arab scientific R&D agencies are unable to transform research results into investment projects, and that vital links to translate S&T output into the market place and promote wealth creation are therefore wanting. ESCWA TC will facilitate the dissemination of expertise and technology-related services in the member countries by creating linkages between the supply and demand sides.

The universities of the ESCWA member countries do not emphasize development of the entrepreneurial spirit in their curriculums. There are no technology licensing organizations that facilitate the linkages between universities and productive sectors, and it is not common for these entities to share laboratories or R&D. As a result, there are no financing mechanisms to activate the linkages between the two. There is no region-wide patents organization and no venture capital, seed capital, matching capital, angel capital or incentives. The securing of partnerships in order to attempt to fill some of the gaps and take remedial action will constitute one of the main tasks of the ESCWA TC. Such partnerships will not be confined to member country institutions but will also be sought with institutions in developed countries. Partnerships will ensure sustainability beyond the project's planned timeframe, and enable an ESCWA TC membership to which institutions can subscribe to be formed, thus providing further funding to ensure sustainability.

Industry in member countries is, in general, not active in R&D. National, regional and international interventions are needed to remedy that situation, and regional centres to promote such activity are essential. Technology parks, technology incubators and specialized networks are few on the ground in ESCWA member countries, while in the European Union there are an average of more than five incubators per million employed persons. There are currently some 4,000 incubators world-wide, but fewer than 15 in the ESCWA region (European Commission 2006; CERAM 2006, UNDP 2003).

Bridges between the supply and demand sides could take many forms, including the adoption of fiscal and financial incentives, the promotion of new linking offices and licensing organizations, the creation of cooperative R&D centres, and the facilitation of access to such financial tools as venture capital, angel capital and matching capital.

It is imperative that a gradual approach is adopted, because the major goals identified, namely, TT, STI policy, human resource development, awareness and promotion, are of a different nature, and so are their respective solutions. Priorities should therefore be set at an early stage. Because of the diverse nature of the ESCWA member countries, the initial focus should be on TT and awareness; something which might in turn result in the generation of local and/or sub-regional TT centres.

Box 3. Issues of relevance to the establishment of a technology centre

The issues and questions set forth below are currently being discussed with respect to the establishment of a European technology institute, an idea to which the European Commission has reacted by calling for a “network solution”. These questions are relevant and could provide material for a useful debate:

- (a) Basic structure: new four walls structure; small network, large network or a combination?
- (b) Priority focus: on education; research and training; commercial exploitation of research or an integrated approach to teaching, research and technology transfer?
- (c) Drivers: issue-driven; discipline-oriented; thematically organized; industrial or economic sector-oriented?
- (d) Added value: how best can a technology centre add value to what already exists:
 - (i) Networking of relevant institutions and facilitating cross-fertilization of knowledge?
 - (ii) Facilitating mobility and attracting the most highly-qualified people?
 - (iii) Raising awareness of science and, in particular, of research and development?
 - (iv) Promoting innovation and knowledge transfer?
 - (v) Developing the demand side and matching demand to supply?
 - (vi) Assisting in developing commercial opportunities?
 - (vii) Promoting entrepreneurial development and activities?
 - (viii) Supporting small- and medium-sized enterprises (SMEs) and local and regional socio-economic development?
 - (ix) Addressing the efficient configuration and structure of the innovative process?

II. OPERATIONAL MODES AND OBJECTIVES

A. OPERATIONAL MODES

Technology transfer normally comprises many complex and interrelated stages and takes place at several levels. It is ultimately represented by a company acquiring and using technology it did not previously have or use. While it usually concerns existing companies, it can also apply to the development of a new branch of industry. The many stages include exploring existing technologies that might be useful to the region; assessing or evaluating in more detail their potential use to the more explicit aspects subsumed under TT; acquiring patents; training people in using new technologies; and buying, developing or manufacturing new designs and equipment. Providing effective support for TT implies a recognition of which aspects or forms of technology should be targeted. In that respect, the practical problems involved in the matching process of demand and supply assume vital importance (see figure 3).

Often TT concerns generic technologies that are being transferred to and used by existing SMEs: larger companies usually have an STI perspective and R&D component. Learning to use different materials; introducing different process technologies and new manufacturing technologies; applying computer-assisted design; adapting new construction technologies; using heating or photo-voltaic technologies; and introducing new economic crops or varieties are all relevant examples. In all cases, however, TT is most effectively organized by an industry organization with effective membership, which could be a role played by the ESCWA TC.

Foreign direct investment (FDI) can be used to promote TT and achieve greater impact. Capacities to use FDI to encourage TT must be built. When effective policies are applied to ensure the employment of a large local workforce and contacts with local suppliers of component materials, the technological quality of local industry can be greatly improved. Policies in that context are normally national or Government: there is little regional or transnational integration in that respect, indicating another niche that can be filled by the ESCWA TC.

Other models that can be followed include such large technology development centres as the National Technology Transfer Center in the United States of America with its six Regional Technology Transfer Centres (RTTC), that link American companies to such federal technological resources as the National Aeronautics and Space Administration (NASA), national laboratories and universities through its National Gateway in several ways, including Web-based schemes. However, many of the RTCC operate on a much smaller scale and they all deal with several aspects that include the following:

- (a) The identification of new technologies and their commercial potential;
- (b) The administration of intellectual property protection and identification of commercial partners;
- (c) The operation of information search services;
- (d) The commercial exploitation, through the private sector, of technology developed with public funds;
- (e) The effective exploitation of databases and ICT-based techniques.

While such centres appear to operate effectively in smaller regions than the ESCWA region, there are important lessons to be learned in developing the ESCWA TC. It is worth noting that there is currently no European TC albeit discussions have recently been initiated to that effect. There is, however, a network of some 80 innovation relay centres that exchange and generate information on the demand for and supply of technologies or partners, and the EU has established the European Organization for Nuclear Research (CERN) and adopted several effective and ambitious regional programmes, including ERICA

(Environmental Risk from Ionizing Contaminants), ESPRIT (EU information technologies programme) and the R&D Framework Programme, which is now in its sixth phase (2002-2006).

A well-established type of TT centre is the technology or science park, which consists of incubation and business development facilities around a well-established university. Those facilities are essentially strictly local, albeit the university concerned may have a wider reach. The Industrial Liaison Program of the Massachusetts Institute of Technology is a case in point. Here too lessons may be learned and adequate provision made for incorporating such activities into the work programme of the ESCWA TC, particularly when addressing issues related to the supply-demand interface.

In the ESCAP region, another operating mode has been adopted. APCTT is expected to fill the TT vacuum with the support of other ESCAP subsidiary bodies, including the Asian and Pacific Centre for Agricultural Engineering and Machinery (APCAEM), the Centre for Alleviation of Poverty through Secondary Crops' Development in Asia and the Pacific (CAPSA) and the United Nations Statistical Institute for Asia and the Pacific (UNSIAP). All three institutions aim to alleviate poverty and enhance the living conditions of the inhabitants of poor and disadvantaged rural areas through appropriate training; awareness campaigns; the dissemination of information; analysis of trends and opportunities for improving the socio-economic development of the region; enhancing region-wide cooperation; strengthening country capabilities to develop, transfer, adapt and apply technology; improving TT terms; and identifying and promoting the development and transfer of technologies relevant to the region. Other regional structures or institutions, including the Non-Aligned Movement (NAM), deal with issues related to TT; however, APCTT is a well-developed and structured centre that could serve as a realistic and workable model for the proposed ESCWA TC (see respective websites).

It would appear from the foregoing that an intimate knowledge of local and regional companies, personal contacts and links to regional or local knowledge institutions are crucial. Equally, national or regional policies that foster TT and link it to other conditions that are vital for its success should be operational. A regional centre such as the ESCWA TC therefore seems likely to find its role in "intermediary-type" activities, namely, supporting national or regional STI policies and local TT activities; making available Web-based information and/or brokerage services; convincing Governments of the importance of new STI policies and TT centres; and giving assistance to member countries by training agents on TT for national, regional or local centres. Of particular relevance in that regard will be activities geared towards policy studies and advice on the creation of new STI institutional forms, networking, promotion of pro-poor technologies, and action in respect of gender-related issues (ESCWA 2001; 2001b).

B. OBJECTIVES

The major objective of the ESCWA TC, as stated in the relevant documents, is to provide support for national and regional capacity-building in STI by promoting the utilization of appropriate modern technologies, with a view to attaining sustainable development objectives and improved productivity and quality, thereby ensuring competitiveness in the knowledge-based global economy. ESCWA TC will thus address the three major components of interaction, namely, competition, transaction and networking.

The ESCWA TC will define priority technology application fields/domains of action and formulate policies and implementation plans in order to meet its objectives in a timely and focused manner through the operational divisions and units set forth in figure 3. Whatever its shape or structure, the ESCWA TC will have to address the following major issues:

- (a) The harnessing of modern technologies in order to promote socio-economic development, alleviate poverty, create employment and address gender issues;
- (b) The transfer and exchange of information and knowledge in the region;

(c) The strengthening of the capabilities of ESCWA member countries to engage in negotiations, particularly with regard to the laws and regulations governing TT and suggest new approaches to such negotiations and for the management of potential resources in a cost-effective manner;

(d) The raising of awareness of the role of science and technology in socio-economic development and promotion of R&D in the region;

(e) The effective interaction with the Governments of ESCWA member countries in order to gain their support and financing for public institutions and regulatory incentives in relation to emerging new STI policies;

(f) The promotion of partnerships and such modern tools and mechanisms for development as ICT, networking, clustering and incubators;

(g) The exploitation of all the value-added benefits of being part of ESCWA.

Any STI centre must respond to the priorities of the countries and the region it aims to serve. Unfortunately, there are no blueprints for the establishment of technology centres in the ESCWA region. ESCWA member country TCs tend to be country or region-specific, and rightly so.

The need for a regional centre, as other regions of the world have discovered, is prompted by economic considerations. While national STI centres would need to continue to provide overall guidance and a variety of services to national bodies and enterprises, the proposed centre would seek to coordinate and harmonize selected activities from sub-regional and regional perspectives, highlighting common priority areas for groups of or, indeed, all countries. In effect, projects implemented by the ESCWA TC would always have a regional dimension, responding to multilateral concerns. They would, furthermore, be designed as far as possible to reduce duplication and make use of national experiences. Furthermore, the ESCWA TC portfolio of activities would be designed in such a manner as to ensure that donor organizations are presented with a more attractive proposition than a narrow national agenda, and that international cooperation is promoted in a manner that responds as fully as possible to national needs. The proposed Centre should also promote cooperation with global STI programmes.

Divisions and units of the ESCWA TC and their responsibilities

(a) *STI Policies Division*

- (i) Technology policies elaboration; guidelines, norms and practices;
- (ii) Technology foresighting for the region;
- (iii) New institutional forms for TT development.

(b) *Technology and Socio-Economic Development Division*

- (i) TT, using the following mechanisms:
 - a. Partnerships with intermediaries, including consultants, technology brokers, chambers of commerce, industrial associations and business information centres offering complementary TT services;
 - b. International networks of technology brokers;
 - c. A TT databank which is updated daily;

- d. TT periodicals, including ESCWA technology publications, catalogues and a value-added technology information service;
- e. Business meetings, workshops and training programmes.
- (ii) Technology development through linkages between R&D institutes and universities and productive and services sectors;
- (iii) Technology upgrading and transfer to SMEs, providing the following TT services to SMEs and intermediaries:
 - a. Information on technology and/or business investment opportunities;
 - b. Matching and pre-selection of prospective business partners;
 - c. Such support services as market feasibility studies, technology evaluation and contract negotiations;
 - d. Finance syndication, including loans, venture capital, grants and incentives;
 - e. Product marketing.
- (iv) Promotion and dissemination of new technologies.
- (c) *Innovation Management Division*
 - (i) Because the process of transformation is complex, developing countries require assistance in evolving coherent strategies and mechanisms for strengthening technology management capabilities for the following purposes:
 - a. Technology selection;
 - b. Technology upgrading and modernization of SMEs;
 - c. Innovation management and promotion, transfer and utilization of environmentally sound technologies;
 - d. Adoption and absorption of new technologies.

With that in view, the ESCWA TC will continuously refine technology management programmes in order to strengthen national capabilities and promote regional cooperation in such specific areas as:

- a. Technology acquisition;
- b. Technology monitoring and assessment;
- c. Technology evaluation;
- d. Promotion of intellectual property rights and the management thereof with respect to SMEs;
- e. Proposals for new laws and regulations for TT;
- f. Promotion of national and regional directives for negotiating TT contracts.
- (ii) R&D in industry;
- (iii) Knowledge management.

(d) *Information and Data Unit*

- (i) Technology information acquisition and dissemination;
- (ii) Publications.

(e) *Capacity-building, Training and Promotions Unit*

- (i) Technical cooperation through national focal points (NFP);
- (ii) Training, workshops, expert meetings etc.

Box 4. Aims of ESCWA Technology Centre

The ESCWA TC will be region-specific and have unique region-tailored objectives and activities. It will:

- (a) Drive the demand side;
- (b) Strengthen linkages between the demand and supply sides of technology;
- (c) Foster synergy and complementarity at the regional level;
- (d) Promote regional pre-competitive research;
- (e) Address region-specific issues in technology transfer;
- (f) Promote regional networks and other intermediary technology transfer institutions;
- (g) Catalyze entrepreneurship and commercial funding;
- (h) Facilitate defragmentation of the technology market with respect to both demand and supply.

III. PROPOSED STRUCTURE

Many of the elements discussed in the previous chapters must be incorporated into the ESCWA TC structure that is being considered. A single four-walls structure and, conversely, a virtual structure, are both deemed inadequate to satisfy the requirements of and create the required partnerships with ESCWA member countries. The Centre should have its physical headquarters in one of the member countries, with satellite national centres around that nucleus in other member countries, in order to be able to address thematic or specific issues in a coordinated and timely manner with the support of NFPs. The required networks will, in turn, constitute the additional institutional forms for specific activities or thematic issues.

This chapter proposes a structure that has the elements to satisfy regional requirements as regards the ESCWA TC (figure 3).

A. MAJOR DIVISIONS OF THE ESCWA TC

1. *STI Policies Division*

Focused attention is required in order to introduce innovative and creative approaches into any national science, R&D, technology and innovation policies. Hence, this Division will primarily promote the elaboration of a new vision for the ESCWA member countries and the region, with matching policies, programmes, projects and implementation tools. Guidelines, norms and best practices will be promoted that are appropriate to the region's particularities and the prevailing overall socio-economic situation, giving due consideration to environmental issues.

In order to achieve that objective, the Division will promote studies and evaluations of the current status of STI in the ESCWA member countries and region and foresighting of the S&T objectives of national innovation systems. The Division will also help member countries with respect to official endorsement of those new policies. Regional policy matters will be based on consensus and promoted accordingly.

2. *Technology and Socio-Economic Development Division*

Pursuant to its aim of promoting the socio-economic development of the ESCWA member countries, the ESCWA TC will provide and facilitate the dissemination of expertise and selected technology-related services in those countries. The ESCWA TC will formulate region-wide programmes that address TT and adaptation. It will provide member countries with consultancy and advisory services, as needed, on the issues of technology acquisition and adaptation and assist them in identifying their technology needs. As a clearinghouse, the ESCWA TC will be able to match prospective partners on the demand and supply sides and will assist in contract and TT negotiations. It will also be instrumental in seeking such adequate financial instruments as venture capital, loans, grants and incentives for SMEs that are primarily oriented to markets within ESCWA member countries. Promotion of smaller TT centres in ESCWA member countries will be a major outcome of those activities.

Technology acquisition will be accorded special attention in the work undertaken by the ESCWA TC. New technology inputs can play an important part in environmental amelioration, both directly and through the utilization of renewable energy devices. The experience of United Nations bodies in that domain will form the basis for Division activities in keeping with sound and culturally acceptable parameters. Provision must also be made to have sub-units within this Division in order to enable more concerted efforts to be focused on specific priority issues. Those will develop over time, as the ESCWA TC becomes fully operational.

The Division will also be responsible for the appropriation of funds or grants for specific activities and/or institutes within the region and/or the ESCWA member countries.

3. *Innovation Management Division*

In order to be able to compete and grow in the ever-changing technological market environment, and generate the required support for SMEs, innovative and creative approaches are mandatory. They will add value to research results, thereby enhancing competitiveness and opening up markets to member country products. Concerted efforts to support such matters as legislation and disseminate result-based information, registration and patenting will require timely and focused attention (ESCWA 2003a, ESCWA 2005c, 2005d).

The Division will also promote and sponsor R&D projects for the establishment of technology parks, incubators, networks and clusters, by providing adequate models of such projects upon request. The development of entrepreneurial spirit has become a major aspect of both the supply and demand sides of technology. The ESCWA TC will provide the necessary assistance and modalities for its development within the countries of the region (ILO and CNRS 2002, UNCTAD 2002, ESCWA 2003a).

Transition by ESCWA member countries to the new mode will require knowledge management, creativity and innovation management.

4. National centres in ESCWA member countries

These will be defined in relation to needs and tasks. They will be considered divisions, along with the three major divisions, some of which, or components thereof, will also be located in ESCWA member countries that are willing to host and support them. Their operations will be dictated by ESCWA TC Executive Board decisions, and their size will largely depend on the willingness of the host country to support and sustain their operations.

Such national centres are not an option, but an absolute necessity, because the ESCWA TC cannot be successful at the national level without a viable counterpart that takes charge of all the work that needs to be done at that level, in addition to coordinating activities with the ESCWA TC.

B. SUPPORT UNITS

In addition to the divisions, there will be three support units that will operate in close coordination, supporting the whole organizational structure (see figure 3).

1. Information and Data Unit

Relevant and timely information and access thereto are key issues to be addressed. Pertinent data are essential to the creation of the necessary awareness, arousing support and introducing the necessary strategic considerations for policy schemes, follow-up and strategic planning and implementation modalities.

A regularly updated TT data bank, business and technology periodicals and information transfer networks will be major support mechanisms to be advertised and promoted on the specially designed ESCWA TC website. The Unit will also maintain databases on indicators relevant to STI (ESCWA 2003c), and promote the creation of regional databases.

ICTs have become important tools for innovation: knowledge has become codified and transferable through ICT networks. The Unit will provide the necessary ICT support to all divisions.

Through the services of the Information and Communication Technology Division (ICTD) of ESCWA, the ESCWA TC will place considerable emphasis on its on-line presence. A portal will be designed and implemented with a view to enhancing Centre activities and facilitating management of information and knowledge of those activities (ESCWA 2003b, 2004). That portal will help to promote the Centre's activities, provide other services to partners, and contribute to funding campaigns. Given the region-wide experience of ESCWA in the field, the Unit could be housed within ESCWA.

2. Awareness, Capacity-building and Promotion Unit

In order to promote STI capacity-building, the ESCWA TC will conduct workshops, seminars and other training exercises on priority issues for ESCWA member countries. As far as possible, such activities will be planned and implemented in coordination and cooperation with the relevant national, regional and international institutions and, in particular, United Nations organizations active in member countries, in addition to stakeholders in both the public and private sectors. Training activities will be designed in order to maximize possibilities for the creation of focal points throughout the region, which will take up further dissemination and integration of STI capacity-building approaches and implementation modalities.

Awareness of the role of STI in economic development should be raised at the decision-making level and within the public perception. With the current trend in the region towards more democratic and

transparent practices, Government financing greatly depends on how people view STI activities and the amount of money which should be allocated to them.

The Unit will also provide additional assistance to ESCWA member countries in the creation of new markets and private sector activities related to technology products and services.

The promotion of a product development and/or design innovation culture and the development of the relevant awareness, capabilities and expertise in member country STI institutions and national enterprises should be one of the objectives of this unit.

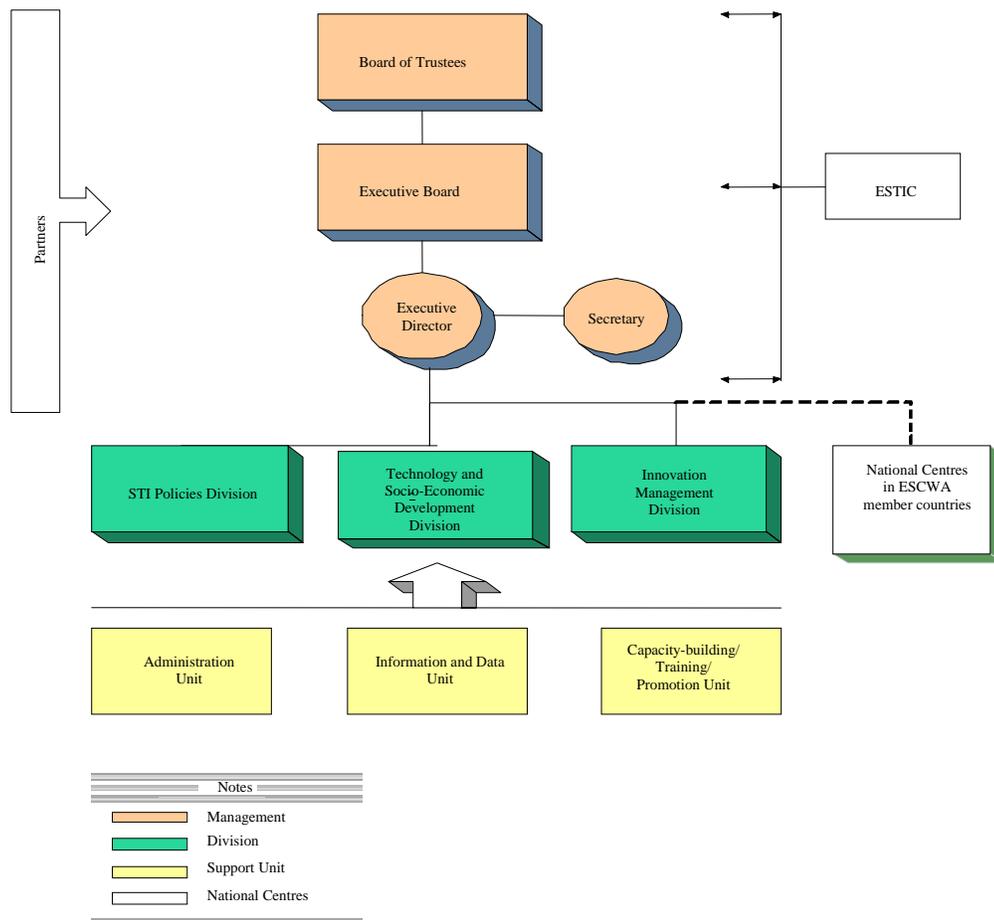
3. Administration Unit

This will be a small unit in charge of human resources, management and operations, financial matters, maintenance and procurement.

C. ORGANIZATIONAL STRUCTURE

In the preceding chapters, basic concepts and operational approaches for the ESCWA TC were presented. Here, the following structure is proposed for the Centre:

Figure 3. Proposed structure



D. FURTHER CONSIDERATIONS IN RESPECT OF THE PROPOSED STRUCTURE

The ESCWA TC will be part of ESCWA but will have the potential to outsource some of the Divisions, Units and priority activities to other ESCWA member countries willing to host those structures and activities. The ESCWA TC should not be part of an already existing line-management structure, but should be a semi-autonomous entity, with proper checks and balances, in line with United Nations regulations.

(a) A Board of Trustees composed of prominent member country personalities and prominent figures from the STI diaspora in the United States of America, the European Union and Latin America will ensure the high profile of the ESCWA TC and be instrumental in forging relationships and securing funds for the long-term sustainability of the Centre;

(b) The Executive Board will be the operational arm of the ESCWA TC. It will be composed of member country specialist focal points. It will engage in policy matters related to STI issues, which will be addressed through three distinct but strongly interacting components. The first will specialize in policies and indicators, the second in technology acquisition and implementation in selected priorities and the third will be in charge of field activities and demonstration STI-harnessing projects. The Executive Board will always be in operational mode and will report to the Board of Trustees. Division heads will be members of the Board. The Executive Board will bring together ESCWA and key players within the ESCWA TC for better coordination, streamlining and follow-up;

(c) The Executive Director will be in charge of overall operations. He/she will implement Executive Board directives, and conjoint plans as indicated by the Board of Trustees and as stipulated in the biennial plans. He/she will be instrumental in setting the agenda in line with activities and priority issues, which are expected to be in a continuous state of flux and dynamism. Recommendations will be translated into action through the Divisions and the Units. The Director will be able to call upon the services of the bulk of the personnel in addition to the services of consultants and/or advisors from the ESCWA Consultative Committee on Scientific and Technological Development and Technological Innovation (ESTIC) and elsewhere when needed. Under the Director, there will be a Manager in charge of administrative and financial matters who will also double as Head of the Administration Unit;

(d) ESTIC will assume the mantle of a specialized STI committee advising the Board of Trustees and the Executive Board. Members of ESTIC could also be called upon in their personal capacities to act as consultants or advisors in performing certain tasks related to the implementation of the ESCWA TC work plan;

(e) National centres in ESCWA member countries will form an integral part of the ESCWA TC. Their operations will be in line with their competence in relation to specific programmes. The location of those centres will depend on the willingness of ESCWA member countries to host and support them, which will be conditional on their ability to perform the requested tasks. In principle, any of the major Divisions or Units of the ESCWA TC could also be housed in member countries.

IV. MANAGEMENT AND OPERATIONAL ISSUES

A. RECRUITMENT AND STAFFING

The professional credibility of the ESCWA TC will depend on the professionalism of its staff. Recruitment should be conducted in a transparent manner in line with United Nations rules and regulations and remuneration will be commensurate with qualifications and experience. Gender balance should be ensured. Numbers of staff recruited will depend ultimately on the overall work programme of the Centre. There will be four categories of staff:

(a) Professional staff on renewable two-year contracts. Numbers will change in line with programmes and activities (levels to be elaborated at a later stage);

(b) Pool of part and full-time consultants from ESTIC members and elsewhere, primarily from ESCWA member countries; representatives of the Arab STI diaspora;

(c) Fixed-term staff seconded from ESCWA member countries and, in particular, from collaborating institutions;

(d) United Nations volunteers and interns.

The involvement and contribution of expatriate Arab expertise to the work of the ESCWA TC will be useful and important. The new generation of such specialists is young, expert, professional and has a wide range of knowledge, and can help, particularly in the initial stages of the ESCWA TC, as, inter alia, trainers and facilitators of networking arrangements.

Seconded staff will be from the ESCWA member countries, and other collaborating institutions and will be employed for a fixed term subject to renewal. That will ensure a better turnover and better promotion of the ESCWA TC. The cost of seconded staff salaries will be borne by donor countries and will be considered contribution in kind to the ESCWA TC budget. Consultants will form a core group dealing with STI issues.

B. COLLABORATION, COOPERATION, PARTNERSHIPS AND ALLIANCES

Because of the limited cooperation between ESCWA member countries, a great deal of emphasis will be placed on action by the ESCWA TC to improve regional and international cooperation in priority areas. Emphasis will be placed on enhancing competitiveness, employment creation and poverty reduction through modern STI inputs. The development of inherent member country abilities to devise pro-poor STI solutions will be highlighted.

Another aspect of partnership and collaboration will be the conduct of regional exercises leading to the establishment of STI structures in the ESCWA member countries. In that task, the ESCWA TC will be assisted by the national STI observatories (NSTIOs) that are currently being established by ESCWA. Output produced by NSTIOs will provide material for periodic reports on the status of STI and emphasize requirements for achieving specific MDGs.

Cooperation will be fundamental to the design and operation of the ESCWA TC. Collaboration with outside partners, particularly with non-governmental organizations (NGOs), universities and public sector research centres will be essential, especially in R&D networking and related activities.

The Centre will encourage ESCWA member countries to design and implement initiatives aimed at national capacity-building in selected areas of STI, with a view to enhancing their national development and strengthening regional and international STI cooperation in priority areas. Towards that end the proposed

Centre, equipped with adequate ICT infrastructure, will promote active cooperation in harnessing technology and technology-based inputs for development and facilitate the sharing of expertise in technology assessment and acquisition between member countries.

As a clearing house and promoter of STI, it is imperative for the ESCWA TC to have partners and forge alliances, particularly with United Nations organizations, public and private institutions involved in STI and major regional and international donors. Potential partners are set forth below:

1. Funding partners and financial contributors

(a) ESCWA member country Governments and relevant ministries, particularly those hosting Divisions or Units of the Centre;

(b) United Nations organizations and agencies concerned with STI and development, including:

- (i) United Nations Educational, Scientific and Cultural Organization;
- (ii) United Nations Development Programme;
- (iii) United Nations Industrial Development Organization;

(c) Arab regional organizations which focus on science and technology, including:

- (i) Scientific and Technology Management Arab Regional Network;
- (ii) Arab League Educational, Cultural and Scientific Organization;

(d) Development banks and funds, including:

- (i) Islamic Development Bank;
- (ii) Kuwait Development Bank;
- (iii) Kuwait Foundation for the Advancement of Science;
- (iv) World Bank;

(e) Such private sector donors and international donors as the Organization of Petroleum Exporting Countries;

(f) Income from services and fees, including:

- (i) Membership fees;
- (ii) Fee for matching of technology buyers and sellers;
- (iii) Advertising in printed material and on-line.

2. Partners in collaboration and cooperation

(a) Relevant United Nations organizations and agencies, including United Nations Conference on Trade and Development (UNCTAD), ECOSOC-Commission on Science and Technology for Development, ESCAP, APCTT;

(b) Technology-related associations, including industrial associations; chambers of commerce, industry and agriculture; and business development agencies;

(c) TT intermediaries, including:

- (i) Economic cooperation agencies;
- (ii) National technology agencies;

- (iii) Technology institutes and centres;
 - (iv) Technology consulting companies;
 - (v) Technology networks;
 - (vi) Specialized NGOs;
- (d) Science and technology institutes in ESCWA member countries, including:
- (i) KISR (Kuwait), KACST (Saudi Arabia), HIAST (Syrian Arab Republic), NRC (Egypt), Arab Science and Technology Foundation, Science and Technology Management Arab Regional Network and Arab Academy for Science and Technology and Maritime Transport;
 - (ii) Major technology-oriented academic institutions and universities;
- (e) Technology information providers, including:
- (i) Publishers on technology;
 - (ii) Technology information centres;
 - (iii) Industrial information networks.

Beneficiaries, including SMEs in the ESCWA countries, R&D institutions, and public and private universities, could also be instrumental in cooperation and part-funding if the ESCWA TC action is perceived as investment in future development.

C. FINANCIAL ISSUES

ESCWA TC will have a separate identity and its own funding. Funding issues should be addressed at a very early stage in order to ensure long-term viability. Funding should be perceived as an investment in the socio-economic development of the member countries. Once those countries give their consent to the establishment of the ESCWA TC, self-interest should be the driving impetus for the allocation of the necessary funds. Regular part-funding by ESCWA and other United Nations organizations will raise the profile of the Centre and mobilize funds from donors in both the private and public sectors. Because the Centre will be able to offer services to private industry, that will in time be reciprocated in the form of financial feed-back.

Funds should be allocated and spent in a cost-effective manner and translated into such visible and tangible results on the ground as joint action, TT, training and awareness-raising in ESCWA member countries. A detailed business plan will have to be prepared at a later stage. Consideration has to be given to the question of the alternative to the ESCWA TC, and what the economic impact of not having such an organization would be. Special provisions should be made for struggling entities or countries with very limited financial resources to have access to the Centre.

Funding will be through an endowment fund set up with ESCWA member country contributions, and eventually also through fees and payment for services. The endowment fund will be an important factor in the sustainability of the Centre, but is only one of the possible mechanisms for that purpose. If sustainable operations depend largely on the endowment fund, the figures in section D make it obvious that contributions to that fund will have to increase considerably.

Low-key promotion of the ESCWA TC should begin as soon as possible, followed by high-level advertisement and promotion after the twenty-fourth ESCWA session in May 2006.

D. ESTIMATED INITIAL BUDGET

Budgetary discussions are premature at this stage, because they depend on such parameters as the work programme that will have to be elaborated at a much later stage through feedback from the special activities set forth in the annexes. However, the figures mentioned represent the budget for the core activities of the Centre as described in this study.

An endowment fund of \$20 million is recommended, representing an expected return on investment (ROI) between \$800,000 and \$1 million per annum which, together with the contribution of host countries, should ensure the sustainability of operations. The budget will come from the contributions of ESCWA member countries, partners and other contributors. Funding will be extrabudgetary. No provision is made in the estimated budget for insurance and other benefits. Logistics support and seed money for this study have been provided by ESCWA.

The following figures will cover three years of start-up activities. The ROI of the endowment fund will be used for the basic needs of the Centre. The budget is broken down as follows:

(a) Salaries: (director, general manager, 3 professionals, 3 division heads, 3 research assistants, 2 secretarial staff, 1 technical staff)	<u>US\$</u> 1,692,000
(b) Expert services (consultants)	240,000
(c) Contractual services*	240,000
(d) Training	750,000
(e) Expert group meetings	100,000
(f) Grants and contributions	150,000
(g) Travel	30,000
(h) General operating services	100,000
(i) Acquisition of equipment	30,000
(j) Miscellaneous	30,000
Total	3,362,000

For 12 months of start-up operations (see table 4) with a staff of nine persons, until activities fully pick up, the following budget is requested:

(a) Salaries: (director, 2 professionals, 1 division head, 2 research assistants, 2 secretarial staff, 1 technical staff)	<u>US\$</u> 312,000
(b) Expert services (consultants)	120,000
(c) Contractual services*	120,000
(d) Training	500,000
(e) Expert group meetings	50,000
(f) Grants and contributions	50,000
(g) Travel	10,000
(h) General operating services	35,000
(i) Acquisition of equipment	40,000
(j) Miscellaneous	10,000
Total	757,000

* Contractual services are for implementation of capacity-building programmes in selected institutions in ESCWA member countries.

E. IMPLEMENTATION AND ACHIEVEMENT INDICATORS

The project will be implemented as part of subprogramme 5 of programme 18 for the 2006-2007 biennium: Information and communication technology for regional integration, under expected accomplishment (b): Activated partnership for implementing ICT projects to achieve socio-economic development, with particular emphasis on MDGs. Cooperation in implementing the project will take place with other subprogrammes and, in particular, subprogramme 1: Integrated policies for the management of regional resources for sustainable development, under expected accomplishment (b): Improved performance and competitiveness of SMEs by networking and clustering and harnessing technology and innovation, and subprogrammes Sustainable Development and Productivity and Centre for Women.

A detailed implementation plan goes beyond the scope of this pre-feasibility study. However, in view of the fact that ESCWA TC activities should gradually evolve and develop, the following major milestones are given (see table 4):

- (a) Issuance of letters of intent from partners, namely, Government authorities, civil society institutions, NGOs and the local community;
- (b) Completion of special activities as listed in annex II;
- (c) Completion of surveys and substantive planning;
- (d) Finalization of detailed designs for and planning studies of the project;
- (e) Publication, delivery and review of studies;
- (f) Conclusion of negotiations with local and central Government authorities in relation to project implementation;
- (g) Completion of design, preparation/adaptation and validation of project activities;
- (h) Issuance of letters of agreement covering in-kind and other contributions by partners;
- (i) Development of yearly work programmes;
- (j) Conclusion of employment contracts;
- (k) Delivery of equipment and other essential goods and services for start of operations;
- (l) Finalization of legal and fiscal documents;
- (m) Implementation and commencement of operations.

Major achievement indicators in relation to the various activities of the ESCWA TC will include the following:

- (a) Number of countries participating in regional programmes aimed at raising awareness about the impact of technology on economic growth;
- (b) Number of SMEs and trainees trained through national and regional programmes for training SMEs on TT;
- (c) Number of ESCWA member countries adopting recommended legislation to improve national enabling environments related to TT, externally through trade ventures and internally through partnerships;
- (d) Number of partnerships created in relation to the following two activities:

- (i) Launching of regional and international partnerships in TT and linkages to international sources of technology;
 - (ii) Convening of expert group meetings to examine programmes for implementation and follow up technology-based initiatives;
- (e) Increase in the number of technology parks and incubators;
- (f) Increase in the amount of venture capital in the region;
- (g) Number of partners participating in established programmes and networks in relation to the following two activities:
- (i) Implementation of a regional R&D network specialized in technologies that have priority for the region and which targets TT, information and application;
 - (ii) Design and implementation of a programme for R&D in the private sector.

TABLE 4. TIMELINE OF ACTIVITIES

ID	Task Name	Start	Finish	Duration	2006				2007				
					Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	
1	Pre-feasibility study	01/02/2006	15/03/2006	31d	■								
2	Virtual Panel of Experts	01/02/2006	24/02/2006	18d	■								
3	ESTIC	06/03/2006	07/03/2006	2d									
4	ESCWA 24th Session	08/05/2006	12/05/2006	5d									
5	Issuance letters of intent	01/06/2006	01/06/2006	1d									
6	Special activities (5)	15/06/2006	30/10/2006	98d		■	■	■					
7	Finalization of studies and planning	01/12/2006	29/12/2006	21d					■				
8	Publications	03/07/2006	30/11/2006	109d		■	■	■					
9	Negotiations with Governments	01/06/2006	30/10/2006	108d		■	■	■					
10	Issuance of contribution requests	01/06/2006	30/10/2006	108d		■	■	■					
11	Finalization of legal and fiscal docs	01/09/2006	31/01/2007	109d					■	■			
12	Concluding employment contracts	01/09/2006	30/11/2006	65d		■	■						
13	Start of operations	01/01/2007	01/01/2007	1d									

REFERENCES

- General Union of Chambers of Commerce, Industry and Agriculture for Arab Countries. Thirty seventh session, 2005.
- CERAM Sophia Antipolis. Les incubateurs: Emergences d'une nouvelle industrie, 2006. Available at: <http://www.ceram.fr>.
- European Commission. 2005. *A European Institute of Technology? The European Commission launches a public consultation*. Available at: <http://europa.eu.int/rapid/pressReleasesAction.do?reference=IP/05/1150&format=HT>.
- _____. 2006. *Benchmarking the management of business incubators*. Available at: http://europa.eu.int/comm/enterprise/entrepreneurship/support_measures/index.htm.
- Economic and Social Council. Commission on Science and Technology for Development, 2003. Report on the sixth session. ECOSOC Official Records 2003, Supplement No. 11 (E/2003/31-E.CN.16/2003/6).
- _____. 2005. Implementation of, and progress made on, decisions taken at the seventh session of the Commission on Science and Technology for Development (E/CN.16/2005/3).
- _____. 2005. Science and technology promotion, advice and application for the achievement of the Millennium Development Goals (E/CN.16/2005/2).
- ESCWA. 1998. Assessment of research and development in selected ESCWA member countries: Local technological inputs. New York.
- _____. 1999. Science and technology policies for the twenty-first century (E/ESCWA/TECH/1999/4).
- _____. 2000. Report of the Expert Panel on Information Technology and Development Priorities: competing in a knowledge-based global economy (E/ESCWA/TECH/2000/1).
- _____. 2000b. Report of the Expert Group Meeting on science and technology policies and strategies for the twenty-first century (E/ESCWA/TECH/1992/2).
- _____. 2001. Expert Group Meeting on coordination of technology policies to increase productivity and competitiveness within the global context: capacity-building initiatives for the twenty-first century (E/ESCWA/TECH/2000/3).
- _____. 2001b. Technology capacity-building initiatives for the twenty-first century in the ESCWA member countries (E/ESCWA/TECH/2001/1).
- _____. 2001c. New technologies for enhancing competitiveness and productivity in selected sectors (E/ESCWA/TECH/2001/4).
- _____. 2002b. World Summit on Sustainable Development assessment report for the ESCWA region (E/ESCWA/ENR/2002/19).
- _____. 2003a. Trade and transport facilitation: E-business and information and communications technology applications (E/ESCWA/ICTD/2003/8).
- _____. 2003b. Knowledge management methodology: an empirical approach in core sectors in ESCWA member countries (E/ESCWA/ICTD/2003/9).

- _____. 2003c. New indicators for science, technology and innovation in the knowledge-based society (E/ESCWA/SDPD/2003/5).
- _____. 2004. Using information and communication technologies to create employment and alleviate poverty (E/ESCWA/ICTD/2004/1).
- _____. 2005. The Millennium Development Goals Report. New York, 2005.
- _____. 2005a. Towards an integrated knowledge society in Arab countries, strategies and implementation modalities (E/ESCWA/ICTD/2005/3).
- _____. 2005b. Networking research, development and innovation in Arab countries (E/ESCWA/SDPD/2005/2).
- _____. 2005c. <http://www.escwa.org.lb/about/gov/session/docs.asp?menuID=25&topic=Resolutions%20adopted%20by%20the%20Commission&lang=e>.
- _____. 2005d. National and regional indicators on sustainable development in selected sectors in the ESCWA region (Arabic only) (E/ESCWA/SDPD/2005/Booklet.1).
- _____, International Labour Organization and National Council for Scientific Research. 2002. Technology and innovation in the Arab countries; status, trends and future needs.
- United Nations Educational, Scientific and Cultural Organization, 1998. Research and development systems in the Arab states. UNESCO Cairo Office.
- United Nations Conference on Trade and Development. 2002. Partnerships and networking in science and technology for development. Technology for Development Series (UNCTAD/ITE/TEB/11).
- United Nations Development Programme. 2003. Arab human development report 2003. New York.
- United Nations Environment Programme. Twenty-third Session of the Governing Council. 2004/2005. International environmental governance. Bali strategic plan for Technology Support and Capacity-building (UNEP/GC.23/6/Add.1).
- United Nations Industrial Development Organization - Global Forum on Management of Technology: Focus on the Arab region. 2001. Meeting technology needs of enterprises for national competitiveness.
- World Economic Forum, 2005. The Arab World Competitiveness Report 2005. Geneva.

Websites

<http://www.jrc.cec.eu.int>.

<http://www.worldbank.com>.

<http://www.apctt.org>.

<http://www.unapcaem.org>.

<http://www.uncapca.org>.

<http://www.unsiap.org.jp>.

<http://www.cordis.lu/esprit>.

<http://www.eric-project.org>.

<http://http://public.web.cern.ch>.

<http://www.The-saudi.net/Saudi-arabia/kacst.htm>.

<http://www.kisr.edu.kw>.

<http://www.nrc.sci.eg>.

<http://www.inpe.br/unidades/cep/atividadescep/educationdirectory/continent/asia>.

<http://www.cnrs.edu.lb>.

<http://www.hiast.edu.sy>.

<http://www.hcst.gov.jo>.

<http://www.cert.hct.ac.ae>.

<http://www.bcsr.gov.bh>.

<http://www.squ.edu.om>.

<http://www.southcentre.org>.

Annex I

**THE ESTABLISHMENT OF THE ESCWA TECHNOLOGY CENTRE:
RESOLUTION 254 (XXIII)**

The Economic and Social Commission for Western Asia,

Noting United Nations Security Council resolution 54/201 concerning the effect of science and technology on accelerating development and on their status as one of the priorities of the United Nations; the report of the Secretary-General on strengthening the use of science and technology in achieving the Millennium Development Goals (MDGs) contained in the Millennium Declaration (E/CN.16/2004/2); and Economic and Social Committee report No. 68/2004 concerning the utilization of science and technology for the purposes of development,

Appreciating that the trend in the global economy is towards a knowledge-based economy that is built on science, technology and technological innovation as the foundation for competitiveness and the achievement of sustainable development goals at the national level; and the linkage between economic growth and the independent capacities of countries in fields relating to modern technology,

Affirming that the generation of opportunities for employment and the reduction of poverty require high levels of economic growth and the diversification of sources of national revenue, which in turn require the provision of a solid basis of science, technology and technological innovation,

Taking into consideration the ESCWA initiative to activate the role of science, technology and technological innovation in achieving MDGs, which was adopted by the twenty-second session, and for the ideal accomplishment of which the establishment of a specialized institutional structure is required,

Noting that United Nations regional commissions have established special centres to assist member countries in their endeavours to build independent capacities in the fields of science and technology that have greatest priority for their sustainable development,

Appreciating the important role that must be assumed by a similar centre in the ESCWA region in assisting national efforts to build independent capacities in science and technology and to coordinate cooperation at the regional and international levels in building such capacities,

1. Requests the secretariat to produce a detailed study, financed by extra budgetary resources, on the establishment of a technology centre that would undertake activities aimed at building national technological capacities and harness those capacities in achieving MDGs and strengthening economic and social development and regional and international cooperation in technological fields;
2. Also requests the secretariat to submit that report to the ESCWA Consultative Committee on Scientific and Technological Development and Technological Innovation before submitting a report on the establishment of a technology centre to the twenty-fourth ESCWA session.

Annex II

SPECIAL ACTIVITIES

A. PREPARATION OF A PRE-FEASIBILITY STUDY FOR THE ESTABLISHMENT
OF THE ESCWA TECHNOLOGY CENTRE
(THIS REPORT)

Motive

- Follow-up to resolution 254 (XXIII) that was adopted by the twenty-third ESCWA Session in May 2005.

Objective

- To obtain approval for the establishment of the ESCWA TC from the twenty-fourth Session in May 2006.

Information and data input material

- ESCWA in-house reviews;
- Comments from the VPE;
- Comments from ESTIC.

Output

- A final document to be presented to the twenty-fourth ESCWA Session in April 2006.

<p style="text-align: center;">Administration information</p>
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<p>Start: First quarter 2006 End: First quarter 2006</p>
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B. DEVELOPMENT OF THE ADMINISTRATIVE REGULATIONS OF THE ESCWA TC

Motive

- Establishment of the ESCWA TC.

Objective

- To draft for approval the regulations covering all institutional, procedural, administrative and financial aspects of the ESCWA TC;
- To ensure that those regulations are consistent with those applied by similar United Nation centres and are subject to the auditing arrangements applied to ESCWA.

Information and data input material

- In-house documents and publications;
- Existing byelaws and regulations;
- Byelaws and regulations of similar institutions;
- Input from ESTIC.

Output

- A set of officially-approved byelaws and regulations to ensure the sustainable management and operation of the ESCWA TC.

Administration information

Start: Third quarter 2006
End: Third quarter 2006

C. DETAILED ASSESSMENT OF REGIONAL NEEDS AND PRIORITIES AND IDENTIFICATION OF IMPLEMENTATION MECHANISMS

Motive

- To initiate detailed assessment of needs and priorities of ESCWA member countries.

Objective

- To accurately identify the needs and priorities and seek mechanisms for effecting impact on the ground;
- To ensure more cost-effective use of resources, manpower and funds;
- To ensure as wide a consensus as possible on the issue within the ESCWA member countries.

Information and data input material

- In-house documents and publications;
- Suggestions made by VPE and ESTIC;
- ESCWA experience of technology parks, clusters, networks and incubators.

Output

- The priority domains to be targeted by the ESCWA TC;
- Material for training, awareness, promotion and publicity campaigns.

Administration information

Start: Third quarter 2006
End: Fourth quarter 2006

D. EXPERT CONSULTATION ON PRIORITY SCIENCE AND TECHNOLOGY DOMAINS

Motive

- The expert consultation will consider domains to be given priority.

Objective

- To provide material for the work programme, and tailor it accordingly;
- To define resource commitments and policy choices;
- To provide material for timely awareness campaigns by the ESCWA TC and ESCWA member countries;
- To agree upon relevant performance indicators;
- To be able to recruit appropriately.

Information and data input material

- ESCWA experience and publications;
- Input from special activity C;
- Experience and suggestions of partner institutions;
- Experience of similar institutions elsewhere;
- Input from ESTIC.

Output

- Clear recommendations as to priorities in member countries and the ESCWA region, in order to focus attention;
- Material for work programmes and work plans;
- Consensus on performance indicators;
- Material for training, awareness campaigns and capacity-building.

Administration information

Start: Third quarter 2006 End: Fourth quarter 2006

E. FORMULATE WORK PROGRAMMES AND ACTION PLANS AND ASSOCIATED COMPREHENSIVE AWARENESS CAMPAIGNS

Motive

- The ESCWA TC must have a well-structured work programme which responds to the needs and reflects the consensus of ESCWA member countries as regards the domains to be given priority.

Objective

- To provide the general material for systematic action by the ESCWA TC and ESCWA member countries;
- To provide the necessary elements for timely awareness campaigns by the ESCWA TC and ESCWA member countries;
- To enable effective recruitment to be carried out;
- Cost-effective budget implementation.

Information and data input material

- ESCWA experience and publications;
- Experience and suggestions of partner institutions;
- Input from ESCWA member countries, when applicable.

Output

- A three-year programme that is focused on regional needs and concerns;
- Material for awareness campaigns and for capacity-building.

<p>Administration information</p> <p>Start: Fourth quarter 2006</p> <p>End: Fourth quarter 2006</p>
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F. DETAILED BUSINESS PLAN FOR THE TECHNOLOGY CENTRE

Motive

- A detailed business plan is required for sustainable operation, management, promotion and the acquisition of funds.

Objective

- To operate in a cost-effective manner and enable forecasts to be made;
- To streamline operations;
- To better promote the ESCWA TC and solicit funds.

Information and data input material

- Input from special activities C, D and E;
- ESCWA experience;
- Experience and suggestions of partner institutions;
- Experience of similar organizations.

Output

- A detailed business plan, including such elements as set-up costs, cash flow and break-even.

Administration information

Start: Third quarter 2006

End: Fourth quarter 2006
