TRANSFER OF SEABED MINING TECHNOLOGY: A STUMBLING BLOCK TO U.S. RATIFICATION OF THE CONVENTION ON THE LAW OF THE SEA?

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INTRODUCTION

The Convention on the Law of the Sea was adopted in April 1982 by a vote of 130 to 4, with 17 abstentions [1]. The United States voted against the text and seven Western European nations were among those that abstained. One of their concerns was that the language on the transfer of technology in the seabed mining provisions exacted too high a price from the Western consortia that have been preparing to enter this industry for the past decade.

This paper examines these technology transfer provisions in the context of the evolving economic conditions that exist in the world today. The economic gap that divides the nations of the world into the "developed" and the "developing" camps has been a concern to many. The developing nations have been demanding technology transfers with regard to investments in their own territories. They have also insisted on an equitable sharing of the resources beyond national jurisdiction and have focused on the potential wealth of the seabed as a first step in their efforts to close the gap between the rich and the poor.

In 1970, all the nations of the world agreed that these resources should be the "common heritage" of humankind and that the developing nations should have special consideration when these resources were exploited. Since then, however, the "rich" nations have felt that they are not so rich and have focused on the seabed resources as a way of using their technological advantage to maintain their economic strength. The negotiations at the Third United Nations Conference on the Law of the Sea [2] did not, therefore, end with a happy consensus, because of the disagreement on the seabed minerals and the technology needed to extract them.

The focus on the transfer of technology by the developing nations -- which is a central component of the program known as the New International Economic Order (NIEO) [3] -- is logical. The developing nations perceive technology as being essential to their successful economic development, but are frustrated by the stranglehold which Western-based multinational enterprises have
over it. At the United Nations General Assembly, a declaration establishing permanent sovereignty over natural resources was adopted in 1962 and the Charter of Economic Rights and Duties of States was passed in 1974 [4]. Technology transfer was isolated as an object of attack and cited as one reason for existing international economic inequities [5].

TECHNOLOGY TRANSFER AND THE DEVELOPING WORLD

Technology Transfer Defined
A simplified definition of technology transfer reads, "the application of science to the solving of well-defined problems."[6] Technology stems from science, going a step beyond pure science. Third World views of technology transfer are, however, generally broader. The term has, for instance, been defined as "all elements of productive knowledge needed for the transformation of inputs into products, in the use of these, in the development and rendering of services, as well as in the generation of further productive knowledge."[7] These inputs include capital, human labor and information [8]. Whereas most technology transfers had been seen by developed nations as including designs, processes and some construction, most developing countries desire the term to include the transfer of a larger set of capabilities and activities. Items which the developing world has deemed necessary for development of industrial technology include:

a) feasibility studies, market surveys, and other pre-investment services;
b) determination of the acceptable range of technologies and eventual choice of technology;
c) industrial processes, including machinery;
d) engineering design and detached engineering;
e) plant construction and installation of machinery;
f) training of technical and managerial personnel;
g) management and operation of production facilities;
h) marketing information; and
i) improvements in processes and designs [9].

Certainly such items are prerequisites to successful economic development for countries operating in the early stages of the industrial cycle.

Technology as Part of the Common Heritage
Developing countries carry this broad view of technology transfer into their negotiations with the developed nations. They argue that this development technology is part of the "universal human heritage to which all countries have access."[10] The current technology gap is sometimes blamed on past imperialism and present neocolonialist dependencies. The developed countries argue that this view is without merit, because technological advances, which result only from substantial investment in research and development (R & D), are
a source of competitive strength which must be dealt with in the marketplace. This perspective is derived from a long-enduring laissez-faire tradition of liberal economic individualism.

These opposing approaches lie at the middle of the present stalemate in the North-South dialogue. Global negotiations continue on many fronts in hopes of achieving a compromise between the developing countries' desire for technology and the developed world's need for natural resources.

Although the basic principle of permanent sovereignty over natural resources has been accepted by the developing world and the developed nations, the concept of technology as being part of the "universal human heritage" has not gained equal acceptance. The primary forum for discussion and debate has been the United Nations Conference on Trade and Development (UNCTAD), which has been holding a series of negotiations toward the drafting of a Code of Conduct on the Transfer of Technology [11]. In this arena, the developing countries have opposed those restrictive business practices of multinational firms that they deem unfair and argued for favorable supplier guarantees in technology agreements [12].

**Multinational Practices Challenged**

The focus of the attack by developing nations has been the licensing practices of the multinationals. These range in form from simple marketing arrangements for introducing new products or management agreements to the establishment of wholly-owned subsidiaries. Bolstered by the international patent structure [13], which allows a multinational to control a foreign market without a capital investment, these practices perpetuate the development inequities and heighten developing country/multinational tensions. The holder of a patent has the exclusive right to produce the patented product directly or to license its manufacture to some third party [14]. Often, however, the owner of a patent will register it in a foreign nation, but will not "work" it there, thus precluding others from using the process. The patent, in this instance, would be for defensive reasons only. Such a system does not lead, and has not led, to promotion of indigenous technological development in the Third World. Instead, less than 5% of all research and development is carried out in the developing world, even though more than 70% of world population lives there [15].

Other practices the developing nations would like to eradicate include the packaging of technology transfers and the abuse by suppliers of their dominant position, particularly in pricing practices. Major goals that the developing countries deem necessary to change the current system are: (1) development of technological capabilities in recipient countries; (2) assurance of the effective performance of transfer agreements (and the technology); (3) national regulation and screening of agreements by recipient states; and (4) development of equitable dispute settlement mechanisms [16]. The developing nations feel these practices and goals must be addressed in order to increase their bargaining leverage in the
The Widening Gulf

Are the developing nations justified in asking for all of this? It is impossible to deny the existence of a wide gulf between the peoples of Asia, Africa, and Latin America on the one hand, and the peoples of the developed nations on the other. Per capita income levels, productivity statistics and health conditions provide ample evidence of this gap. It is clear that a myriad of factors account for this situation, but it is also clear that fundamental systemic reform is needed to close this gap. Without such action, the massive debt burdens that exist in developing countries today will expand and have dramatic negative impacts on world trade and development. Substantial increases in energy import bills alone could trigger such a calamity [17]. It is no answer to complain that developed nations also have problems.

Some argue that the developed world has a moral obligation to improve the lot of the less developed countries. Opponents of the NIEO claim that "[c]urly on the bankrupt theory of retributive justice as applied to the post-colonial era could one hope to defend the dichotomy of the Third World view ..."[18] But it is also possible to argue in favor of such a commitment on grounds of simple self-interest and rationality. By assisting the developing world, the West can serve its own narrow political ends (e.g., discouraging outside tampering with desperately weakened nations in need of capital, food and arms) and increase economic stability of all nations to promote global trade. This economic stability would not only create more opportunities to develop markets for goods and services from developed nations, but also would reduce the threat of nuclear blackmail by frustrated leaders and lessen the probable negative impact of rampant worldwide population growth [19].

National Efforts to Require Technology Transfer -- Selected Cases

Developing nations have increasingly required technology transfer as a condition of foreign investment in order to reduce the technological gulf between themselves and developed nations. Access to technology is of critical importance in the quest for economic development and independence, because without it, developing nations are unable to tap their own resources. Screening allows developing nations to perform a selection function, identifying ways in which technological needs can be met by available technology, evaluating appropriate technologies, unpackaging technology bundles, negotiating the best terms and adapting the technologies once absorbed [20]. This process is facilitated by the establishment of a centralized agency or ministry, empowered by the legislature or executive to register or reject foreign technology transfer agreements. This section will begin with an overview of the first modern screening process to be established, that of Japan, and then proceed to a review of a few of the transfer programs.
now in use, namely those of the Andean Pact nations, Mexico and Korea.

Japan

Technology transfers have been taking place for years, despite the fact that awareness of the problems and issues associated with them have only recently achieved recognition. During the postwar occupation of Japan by the U.S. Armed Forces, the Ministry of International Trade and Industry (or MITI) was created to assist in Japan's economic recovery. In the 30 years since the Occupation, MITI has evolved from merely regulating technology transfer to coordinating technological growth and development with national economic goals [21].

MITI works in conjunction with the Agency for Industrial Science and Technology (AIST) to administer legislation on foreign investments and to plan domestic industrial development. Working committees, consisting of engineers from MITI, AIST and specialists from consulting firms, universities and private industry gather and evaluate the needs of a particular sector and consider which available technology might fulfill these needs. Considerable attention is paid to the suitability of the package for disaggregation and local development [22].

Japan's institutional framework for screening has facilitated adoption and adaptation of foreign technology and promoted greater policy cohesion [23]. It was rapidly recognized by other developing countries as a model worthy of emulation, inspiring them to establish screening mechanisms of their own.

The Andean Pact Nations

Responding to the cues from MITI, Brazil promulgated a decree in 1962 [24] by which all technology agreements requiring payments to be sent abroad were to be registered with the Central Bank. In 1970, the creation of the Instituto Nacional de Propiedad Industrial (INPI) took screening beyond mere review of foreign exchange issues and into the realm of overall scientific and social policy; its purpose was specifically to approve or reject technology agreements [25].

The serious economic conditions in Latin America during the 1960's inevitably inspired a cooperative effort among various other Andean nations with respect to foreign investment [26]. In an effort to improve their weak bargaining positions, Bolivia, Chile, Colombia, Ecuador, Peru and later Venezuela decided to adopt a framework of investment rules as a regional body -- the Andean Common Market (ANCOM). Based on the Andean Subregional Integration Agreement or Cartagena Agreement, ANCOM was inspired by the Japanese and drew upon the antitrust and restrictive business practice legislation of the U.S. and the European Economic Commission in order to promote effective government involvement in the economic and social direction of member nations.

Decision 24 of this accord set the guidelines by which technology transfer contracts were to be judged by these
nations, approval being contingent on "effective contribution of the goods incorporating the technology."[27] The Code ensures flexibility in the decision-making process by virtue of its minimal standards which allow existing relationships to flourish and new ones to be developed [28].

The cumulative effect of these regulatory schemes and screening control mechanisms has been to give Andean nations greater command over their technological destiny, a substantially better sense of direction in technology policy planning and a start toward the development of Indigenous technology through local research and development.

Mexico

Latin America's successful implementation of the Cartagena Agreement served as a stimulus for Mexico's Technology Transfer Law of 1972 [29]. According to the Director General of Mexico's National Registry on the Transfer of Technology:

[The major aim was] to strengthen the bargaining power of the national buyers and to make possible for local enterprises the access to the best available technology on the best conditions of opportunity, quality, and prices [30].

Under this law, registration is required "of those documents indicative of agreements having legal effects in the territory of the Mexican Republic, and whose object is the transfer of technology in any form."[31] Unless agreements are submitted to the Registry within 60 days after execution, they are considered without legal effect and are thus unenforceable in Mexican courts; they are also unable to qualify for incentives normally offered to foreign investors [32]. Bureaucratic delay is avoided in a provision whereby submitted agreements which have not been acted upon within 90 days are automatically deemed valid and registered [33].

Flexibility is the key to the 1972 law which allows authorities to ignore specific restrictive provisions normally prohibited in technological agreements as long as overriding national needs are fulfilled by the technology being received [34]. Article 7 enumerates the fourteen circumstances under which registration is to be denied [35], but implies both a technological and economic evaluation of agreements.

Various criteria other than those specifically mentioned in Article 7 are used by the Registry in its evaluation [36]. Negative determinations may be appealed in a two-stage appeals process.

To date, the Registry has been very effective in administering the law on transfer of technology. Ministry officials are able to negotiate on a more equal footing with foreign technology owners, and substantial technology advancement has flowed into Mexico [37].

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Korea

Most notable of the Asian nations' technology transfer programs is that of Korea. Starting from a position similar to that of Japan and progressing by concentrating on many of the same industries as did Japan during its development phase, Korea has undergone a successful and rapid economic development.

Various government branches have been established in Korea to deal with industrial and technological policy. Each is dedicated, in different ways, to coordinating national efforts at control of foreign technology imports. Three statutes were enacted which contain distinct legislative outlines for interagency planning and review of potential technology agreements. The economic success of this nation speaks well for the efficacy of the system [38].

From the various examples discussed above, it is clear that technology transfer to developing countries is an inevitable and reasonable byproduct of investment. Both developing nations and multinational enterprises must learn to look at the screening process not as a negative, restrictive mechanism, but as a potential reward structure. This process is feasible by relating registration and approval of technology agreements to incentive schemes, thereby encouraging multinationals to comply with screening rules. All parties to these national technology agreements appear to have come to the realization that without greater cooperation, creativity and flexibility, neither the developing nor the developed world stands to make significant gains.

Technology Transfer and the UNCTAD Code of Conduct

In addition to these national efforts, regulation of technology transfer has been a major topic at the negotiating tables at international conferences dealing with North-South economic issues. Primary among these conferences has been the UNCTAD negotiation of a draft Code of Conduct on the Transfer of Technology.

Following on the heels of the Declaration on the Establishment of a New International Economic Order and the Charter of Economic Rights and Duties of States (both in 1974), the UNCTAD Code of Conduct has been at the heart of the developing countries' efforts to regulate multinational transfers of technology. Initially drawing largely from the Latin American models of domestic technology screening laws [39], the draft Code of Conduct reflects many developing country preferences. Restrictive practices of multinationals are curtailed [40], development of indigenous technological capability is promoted [41], and provision of truly "appropriate" technology is emphasized.

Despite several years of negotiations, however, a consensus has yet to be reached on a final acceptable draft Code. Fundamental disagreement remains on whether the Code should be legally binding or merely a set of guidelines. The latter
position is insisted upon by developed nations. Equally significant is the failure of developed nations to agree to the demands of developing countries that technology suppliers guarantee the termination of practices deemed to restrain economic development in the latter group's nations.

In the course of the negotiations, however, a major positive outcome has been the modification of multinational behavior in recent technology transfer transactions. Recognition of the seriousness of the developing countries' position and responsiveness to heightened global sensitivity toward past questionable practices have each contributed to the willingness of technology owners to bring their contracts more into conformity with new national regulatory schemes. Yet this behavioral adaptation is a far cry from agreeing on an all-encompassing Code. Thus, as will be discussed below, the successful implementation of technology transfer regulations through the UNCLOS III Convention may assist the developing countries' positions regarding a broader Code of Conduct.

THE THIRD UN CONFERENCE ON THE LAW OF THE SEA

Background

Developing nations have been unsuccessful in codifying their view that rules in a Code of Conduct on Transfer of Technology should be of a mandatory nature. Developed nations adamantly insist that the Code should provide guidelines only. At the Third United Nations Conference on the Law of the Sea (UNCLOS III), however, the idea of a mandatory transfer of seabed mining technology has firmly taken root.

The UNCLOS III negotiations have addressed issues involving fishing, national coastal jurisdiction, navigation, environment, scientific research, seabed exploitation and technology transfer. Initially, participants in the conference sought to agree upon as many distinct issues as possible, through separate treaties if necessary. Subsequently, however, the decision was made to tie the entire range of substantive areas together in one unified treaty [42]. Both the developing and the developed countries viewed this approach as desirable, because each group had specific objectives that it wanted to attain, at high costs if necessary. The developed nations, for instance, wanted firm rules on the freedom of navigation through straits and other ocean spaces that were coming under national jurisdiction. This scenario made much easier the developing countries' efforts to obtain agreement on the 200-mile exclusive economic zone and contributed to the incorporation of the "common heritage" of humankind doctrine into the seabed mining provisions [43].

Negotiators for the United States worked hard to stay in the forefront of developments, realizing that the Conference was codifying existing international practice relating to the oceans, as well as creating new legal principles. The consensus inherent in the UNCLOS III process has caused parts of the Convention to become customary international law already. Some observers have criticized pre-Reagan Administration negotiating teams of having a "treaty at any cost" attitude [44].
accomplishments in areas of primary substantive interest to the United States would not, however, have been possible without such enlightened flexibility [45]. Proponents of the view that the U.S. can do whatever it wants and under its own terms fail to recognize the critical fact of interdependence. The fates of both the developed world and the developing world are inextricably intertwined. Sooner or later, the United States will find it must return to the international arena and reach agreements with the other nations of the world.

Relationship of Other International Discussions

One of the concerns of the negotiators at UNCLOS III has been whether the various provisions of the Convention would have precedential effect upon other negotiations, and thus what effect this treaty would have on the overall North-South dialogue. The seabed provisions might, for instance, be viewed as a model for the negotiations on renewable energy resources, the regime to govern the moon and outer space, the use of Antarctica, commodities agreements, food cooperation, and environmental monitoring. In addition, the seabed mining provisions could affect the stalemated negotiations on the Code of Conduct on the Transfer of Technology. Developing countries have hoped that once the idea of sharing common resources is recognized in one treaty, it will become an accepted approach in other treaties as well. Developed nations, which argue that they have accepted the "common heritage" principle in the seabed negotiations because of the unique features of these resources and in order to effect a quid pro quo for agreements on other issues, assert that the UNCLOS III Convention should not become a model for other negotiations and agreements. Only time will tell which position holds.

Early Issue Formulation

The U.N. Conference on the Law of the Sea in 1958 resulted in conventions addressing the territorial sea, the high seas, the continental shelf, and fishing [46]. The seabed and its resources did not become a concern until the mid-1960's [47]. Malta's Ambassador Arvid Pardo focused concern in 1967 with his proposal urging that the ocean floor resources be considered part of the "common heritage" of humankind [48]. After several years of discussion [49], the U.N. General Assembly adopted in 1970 a Declaration of Principles which proclaimed,

1. The seabed and ocean floor, and the subsoil thereof, beyond the limits of national jurisdiction ... as well as the resources of the area, are the common heritage of mankind ...

7. The exploration of the area and the exploitation of its resources shall be carried out for the benefit of mankind as a whole, irrespective of the geographical location of States, whether land-locked or coastal, and taking into particular consideration the interests and needs of the developing countries [50].

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Disagreement has continued, however, on the meaning of "common heritage," on whether it means common ownership and international control of the resources on the deep seabed.

U.S. mining interests have argued that they have the authority to mine the deep seabed, in the absence of a multilateral treaty. Because of the instability of such a situation, these arguments may have been made for negotiating purposes rather than because the mining companies seriously imagined mining without the protections of a multilateral treaty. By 1978 three major deep seabed issues required resolution by the First Committee of UNCLOS III: (1) political control of the Authority (51) (the Council's jurisdiction, composition, and voting system); (2) the Authority's resource and production policy; and (3) the system of seabed exploitation including the technology transfer provisions (52). The remainder of this paper will focus on the third issue -- the transfer of seabed technology.

**General Principles on Transfer of Marine Technology Under Part XIV of the Convention**

The general governing principles on technology transfer are found in Part XIV of the UNCLOS III Convention entitled, "Development and Transfer of Marine Technology." This Part provides for development and transfer of technology for exploration, exploitation, conservation and management of marine resources, protection and preservation of marine environment, marine scientific research and other activities compatible with the Convention. The aim is to promote use of ocean resources and accelerate the social and economic development of the developing states (53). States parties are required to promote certain basic objectives, such as the acquisition, evaluation and dissemination of marine technological knowledge, the facilitation of access to such data, the development of appropriate technology, the development of necessary technological infrastructure to facilitate the transfer of marine technology, the development of human resources through training and education programs, and international cooperative efforts at regional, subregional and bilateral levels (54). They are supposed to achieve these goals through the use of programs, promotion of favorable conditions for conclusion of agreements, holding of conferences, exchange of scientists, and utilization of joint ventures (55). The objectives of the Seabed Authority are to be met by using developing country nationals on the Authority's managerial, research and technical staffs, making technical documentation available to all states, and easing the acquisition of skills, know-how, professional training, equipment, processes, plant and other technical know-how (56). Finally, these efforts are to be aided by establishment of national and regional marine scientific and technological centers (57).

In setting out these objectives, however, the Third Committee did not provide assurances adequate to developed nations that their proprietary interests and extensive investments would be protected. The only language on this
question states that in promoting the cooperation mentioned above, states "shall have due regard for all legitimate interests, including, inter alia, the rights and duties of holders, suppliers and recipients of marine technology."[58] Some critics of the Convention have focused on this weak language as a major reason for approaching the entire treaty with caution [59].

These same principles govern the treatment of technology transfer in Part XI of the Convention, which deals directly with the seabed. Transfer of technology, broadly speaking, is to be overseen under Article 144, by the International Seabed Authority, which is to coordinate the acquisition of technology for developing States and the Enterprise, under "fair and reasonable terms and conditions."[60] The developed nations have complained because this provision omits any reference to "commercial" terms and conditions [61]. The bare concept of "fair and reasonable" is viewed as inadequate by developed country standards, because it fails to take into account market forces [62]. The term "commercial" is, however, inserted in Annex III to flesh out the skeletal provisions of Article 144 [63].

THE SEABED MINING INDUSTRY

Introduction

Article 153 of the UNCLOS III Convention sets the basic direction for exploration and exploitation in the deep seabed, declaring that activities in the seabed shall be carried out by (1) the Enterprise [64] and (2) states parties or states entities, or natural or juridical persons which possess the nationality of states parties or are effectively controlled by them or their nationals, when sponsored by such states [65]. These activities shall be carried out only after approval of plans of work submitted to the International Seabed Authority, subject to requirements in the annexes [66]. This structure has been called a "parallel system" of exploration and exploitation. In the spring negotiating session of 1982, amendments were made to give specific advantages to the "pioneer" investors, the initial consortia that have invested in this industry.

The Technology

Mining is by nature a highly capital-intensive and volatile industry, on land and at sea. It requires extremely large initial capital outlay, often years in advance of production, and is subject to widely fluctuating price swings in the metals markets. Research and development costs can be exorbitant, but much of the technology is applicable in a variety of situations, thus allowing cost spreading. These factors contribute to the characterization of mining as a risky business. It is always difficult to obtain financing for projects because banks tend to be quite conservative institutions. Nonetheless mining industries are essential to the productivity and prosperity of both the developed and developing nations.

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Ocean mining must face all of these problems, and also the expense and difficulty of creating the new technologies required for prospecting and extracting minerals from the ocean floor. These novel technologies can only be developed after expenditure of huge sums on research and development. An additional complication is that development of extraction technology is extremely site-specific or site-dependent, not only for site refining exploration, but also for design and acquisition of dredge heads, refining plants, and to some extent, ships and lift systems [67]. Without some certainty that it will have rights to a particular site, a company interested in ocean mining cannot launch an investment program of hundreds of millions of dollars for appropriate technological development.

One recent report outlines two alternative systems not yet properly tested, but under current consideration for use in seabed mining [68]. The first concept is a variation on the airlift system presently employed in most projects:

The concept is based on the creation of a low density of the slurry mixture in the transport pipe (as does the airlift), however, with a significant reduction in power consumption ... achieved by using non-expanding light particles mixed with the water/nodule slurry instead of compressed air. The system consists of an essentially vertical pipe for the slurry transport, one or more pipes for the downward transportation of the light particles, and an installation to sluice these particles into the pipe [69].

By using a water pump and pressurizing the pipe, an airlock will be created to draw the nodules. It has been estimated that a 50% decrease in energy consumption could result without even requiring significant alteration of present airlift system nodule mining vessels [70].

The second concept is based on vertical capsule transport. This design makes use of a collector system suspended from a semi-submerged buoy, with nodules collected and lifted through a riser pipe, inside capsules. The driving force would be a pressure differential created over the two legs of the transport pipe. The apparent advantage of the system is that it will be energy efficient, although mechanically more complex than the airlift system [71].

The Consortia

Technological complexities such as those just described stimulated the creation of joint ventures and ocean mining consortia. These consortia comprise firms from several countries, although most are dominated by U.S. companies. They not only share information and expertise, but also spread risks, share the high equity commitments, and gain a broader measure of support from their respective governments negotiating at UNCLOS III [72].

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When Will the Industry Begin?

Why has the commencement of commercial operations been delayed? First, delays have occurred because there have been "greater difficulties than anticipated in scaling equipment designs up to full commercial size and reliable operation at actual minesite depths" [73]. A second cause has been the imposition of limits on available financing for continued work. As mentioned above, mining is a risky business and banks have approached it very conservatively, when doing loan analyses. A third ground for delay is the technological restriction created by seabed mining technology's mine-specific nature. In the absence of assurances that mining will be permitted on a specific mine site, companies are less likely to risk the great sums necessary to prepare for production. Development of a single mine site would cost approximately $1 billion [74]. This extraordinary cost leads to the fourth factor causing a delay -- the uncertain political climate created by the divisions among the nations at the UNCLOS III negotiations. Companies have been concerned that they may not be able to retain sites if they proceed to mine now, and that they may not be able to get a favorable return on their investments under the regime envisaged in the Convention.

The Transfer of Seabed Mining Technology Under Annex III

Introduction

Annex III of the UNCLOS III Convention contains 22 articles detailing the "basic conditions of prospecting, exploration and exploitation." These provisions approach the resources of the seabed from the perspective recognized in the 1970 Declaration of Principles that these resources are the "common heritage" of humankind and that they should be developed by "taking into particular consideration the interests and needs of the developing countries." [75] Annex III has also been drafted in light of the experience gained by developing nations that have required technology transfer in their bilateral investment negotiations in recent years.

Annex III begins by outlining the rules governing prospecting [76] and the exploration and exploitation [77] of minesites. The International Seabed Authority is instructed, in evaluating applications, to favor those applicants that will: "(a) give better assurance of performance, taking into account the financial and technical qualifications of the proposed operator and performance, if any, under previously approved plans"; "(b) provide earlier prospective financial benefits to the Authority, taking into account when production is scheduled to begin"; and "(c) have already invested most resources and effort in prospecting or exploration" [78]. These criteria favor the Western consortia that have already made progress in the development of ocean mining processes. These consortia have, however, been concerned about whether they will be able to recover their high initial investments on the basis of a single mine site, should they be so limited.

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In response to these concerns, the Conference passed in its spring 1982 session Resolution II Governing Preparatory Investment in Pioneer Activities Relating to Polymetallic Nodules, commonly referred to as the Preparatory Investment Protection (or PIP) Resolution [79]. The PIP Resolution states that eight sites are to be set aside for "pioneer Investors," those already exploring the seabed. Four are reserved for the major consortia dominated by U.S. concerns, and one each is held for France, Japan, India and the Soviet Union [80]. In addition, the Enterprise will be able to operate as a pioneer Investor. Rights of these pioneer investors are assignable [81].

The PIP Resolution describes what activities are allowable, how portions of the pioneer area will revert to the international area over time, what requirements must be met in order to register as a pioneer investor, how disputes are to be settled, fee schedules, and methods for allocating production authorizations. No entity may become a pioneer Investor unless it is sponsored by a state party to the Convention [82]. Parvading the entire design is an essential symmetry with the cognate provisions regarding exploration, approval of work plans, and the training and transfer of technology which are governed by Annex III, Article 5 of the Convention. The Conference intended, however, that the PIP Resolution have effect only until the entry into force of the Convention itself [83]. The PIP Resolution was not adequate to satisfy the dissenting U.S. delegation. Chief U.S. Delegate James L. Malone lamented that "while providing access to pioneer firms, the treaty does not ensure that other qualified miners from the private sector will have access to future mine sites" [84].

**Mandatory Transfer Under Article 5**

At the heart of Annex III is the controversial article imposing a mandatory technology transfer scheme, Article 5. The transfer requirements begin even before approval of a work plan. Each application must provide "a general description of the equipment and methods to be used in carrying out activities in the Area, as well as other relevant non-proprietary Information about the characteristics of such technology, and Information as to where such technology is available" [85]. This requirement is similar to the "screening" done by developing countries when considering technology transfer proposals in individual nations. This language has nonetheless caused consternation among Western delegations, particularly the extent to which non-proprietary descriptions must be provided.

If its work plan is approved, the operator must update the Authority on the descriptions given, if a "substantial technological change or innovation is introduced" [86]. Approved plans take the form of contracts between the Authority and the operator [87], each contract containing a series of undertakings by the operator. These undertakings -- found in paragraph 3 of Article 5 -- constitute the core of the developing countries' demands on access to seabed mining technology.
Primarily, an operator must make available to the Enterprise, upon demand, technology which it actually uses in carrying out the approved activities. This technology must be made available on "fair and reasonable commercial terms and conditions." The transfer may be accomplished by licensing or any other appropriate means agreed upon in negotiations with the Enterprise [88]. The Enterprise may only invoke this mandatory transfer provision if it is unable to obtain "the same or equally efficient and useful technology on the open market on fair and reasonable commercial terms and conditions."[89]

These provisions have been controversial for several reasons. First, even though the term "commercial" has been inserted in the "reasonable terms" clause, it is hard to reconcile a mandatory transfer with commercial terms and conditions [90]. The mandatoriness reduces the bargaining position that the technology owner would have in a normal market transaction. Second, the technology that is to be transferred is that which the operator actually uses [91]. This point of clarification was made at the Ninth Session in the summer of 1980 in order to "avoid any implication that [the operator] might be required to transfer technology before he has used it himself" [92]. The previous wording had left this question unresolved. Third, the transfer obligation extends only to technology that the operator is legally entitled to transfer [93], but the operator has an obligation under subparagraph 3(b) to obtain certain technology. Fourth, the condition precedent for the invocation by the Enterprise of these provisions, the inability to acquire "the same or equally efficient and useful technology" [94], implies that the Enterprise would have to make a good faith effort to obtain the technology on the open market. This interpretation was tendered by the UNCLOS III co-ordinator for matters relating to the over-all exploitation of the seabed, Mr. Harry Wuensche of the German Democratic Republic [95]. With the technology only beginning to emerge, however, this clause is likely to have little meaning, because virtually no technology available on the open market will be comparable to that which the applicant parties hope to employ in their mining operations. This situation might change if some of the consortia decide to license or sell their technological developments, rather than depending on profits from their own full-scale ventures. Such an approach could help recoup some research and development expenses. Nonetheless, few major proprietors are expected to develop systems exclusively for sale to the Enterprise because they would probably not be able to recover their substantial investments, much less earn a favorable return. Further limiting this clause's appeal is the absence of any definition of "equally efficient and useful technology." The developed nations have been concerned that this language will allow the Enterprise to request the transfer of the operator's technology virtually at will.

Once the Enterprise does turn to the operator for its technology, the technology is to be made available by agreement between the parties. Disputes over whether the deal is being
closed on truly commercial terms and conditions can be submitted to binding commercial arbitration similar to that used in other international business transactions, utilizing the recently devised UNCITRAL rules, or similar ones [96]. Only offers made by the operator are subject to such arbitration on the question of commercial reasonableness, although either party may submit the dispute to arbitration [97]. Negative determinations (against the operator) by the tribunal do not result in automatic action against the operator. Rather, it has 45 days in which to revise its offer before the Authority may impose penalties for violation of contract [98].

One major problem, as mentioned above, is the situation in which the operator is licensing seabed mining technology from a third party and does not have the right to alienate it or sublicense to anyone else. How then can the operator transfer it to the Authority? Subparagraph 3(b) of Article 5 was written to respond to this situation [99]. Any operator using technology for mining, under an approved plan, which does not own that technology or the legal right to transfer it, must obtain written assurances from the owner thereof that the owner will, upon request from the Enterprise, make the technology available to the Enterprise to the same extent as made available to the operator, under lease or other negotiated form. This provision applies only if the technology is not available on the open market. Operators failing to negotiate this assurance in the course of contracting for the use of a third party's technology are precluded from carrying out activities in the Area [100].

Acquisition of the right to transfer technology to the Enterprise is required by subparagraph 3(c), "whenever it is possible to do so without substantial cost to the contractor."[101] Since the word "substantial," is not defined, the intent of this provision is a matter of controversy. The United States' interpretation has been that "[I]t was understood that the Enterprise would bear any substantial cost resulting from carrying out these obligations if the Enterprise requested the contractor to acquire such a legal right."[102] The language goes on further to state that the operator must take "all feasible measures" to accomplish this required goal [103]. In evaluating whether such measures have been taken, the Authority is instructed to be on the watch for any "substantial corporate relationship" which may exist between the operator and the owner of the desired technology [104]. The closeness of the relationship and degree of control or influence exerted over the owner will be considered relevant in this determination. Should the operator exercise effective control over the owner and be unable to acquire these rights, this fact is likely to prejudice its chances for gaining approval of any subsequent plan of work [105]. Thus, attempts to avoid these requirements through use of dummy corporations should be doomed to failure.

If for any reason the Enterprise decides to enter into negotiations with the owner of the technology directly, the operator is bound to facilitate the acquisition by the
Enterprise of the desired technology. Once again, this occurs upon the inability of the Enterprise to first purchase on the open market [106].

One of the stickier issues of the Conference relating to technology transfer had been the requirement, in subparagraph 3(e), that the measure prescribed above shall apply not only to the Enterprise, but also for the benefit of a developing state or group of developing states applying for a contract on one of the reserved sites [107]. These requirements are not supposed to apply if it would involve the transfer of the rights to third states or their nationals, either immediately or ultimately [108], and these standards are activated only when the Enterprise itself has not requested the technology from the operator [109]. Nonetheless, this clause has been bothersome because it does not have enough bite to ensure that developing nations and their respective nationals will not divulge to third parties proprietary knowledge submitted in confidence by the operator.

Means of Ensuring Enterprise Access to Technology

Failure of operators to comply with the measures mandating either transfer of technology to which they have legal rights or acquisition by them of such rights was originally to be dealt with by blacklisting the operators and owners. Considerable disgruntlement over such an approach caused its abandonment. As a compromise, paragraph 5 contains an obligation on the part of states parties to be responsible for acquiring the technology in certain of these circumstances [110]. The Council or Assembly may convene a group of states parties composed of those which are engaged in activities in the seabed, those which have sponsored entities which are engaged in such activities and those having access to the requisite technology. The group is to act in unison to ensure provision of the technology necessary for the Enterprise to begin "in a timely manner" the recovery and processing of minerals. Individual states parties are to take all feasible measures to this end within the bounds of their respective municipal legal systems [111].

This provision indicates not only that governments may be required to incur appreciable expense and possibly to intervene in their national marketplace via expropriation or other means, but further implies that the Enterprise must be given processing technology, too. This interpretation appears to be inconsistent with the purposeful deletion of any reference to technology for processing or other "downstream" activity in the other relevant sections of the Convention [112]. Equally troublesome is the fact that states are unlikely to effectuate fully the intent of this clause where such action would be violative of traditions and legal rights guaranteed by their respective constitutions, national charters, or other sources of domestic legal principles.
Joint Ventures

For the special case of joint ventures between the Enterprise and any other qualified applicant or state party, the transfer of technology shall be regulated explicitly in accordance with the terms of the joint venture agreement [113]. In negotiating this special case, the Conference participants felt the Enterprise will have sufficient bargaining power and skill to obtain what it needs. An incentive structure is to be created in order to encourage such joint ventures [114]. The Enterprise will probably be successful in these endeavors because its participation will make approval of a venture virtually certain, thus providing a stimulus to those other entities with appropriate technology which are anxious to begin operations.

Time Limits

The time limit clause on the transfer of technology, revised several times in the course of negotiations, now establishes a ten-year period after the Enterprise begins its operations:

The undertakings required [of the operator] by paragraph 3 shall be included in each contract for the conduct of activities in the Area until 10 years after the Enterprise has begun commercial production of minerals from the resources of the Area and may be invoked during that period [115].

Prior versions of this clause provided that such undertakings would be included in contracts only until the Enterprise had begun commercial production. The compromise was reached on the basis of the United States and other industrialized States seeking a 5-year limit and the developing states pushing for no time limit -- i.e., a never-ending obligation. The former group agreed to a 10-year period in exchange for "assurances" by the latter group that it would not press for inclusion of processing technology in the transfer obligations of Article 5 [116].

Even if companies should see some means by which to delay the use of the most advanced and productive technologies until after this 10-year period has expired, thus avoiding the transfer obligations temporarily, they are still not able to predict with certainty that they will be "home free" owing to the mandatory Review Conference imposed by Article 155 of the Convention [117]. On a more practical level, however, the economic realities are such that it is inconceivable that a company would take the risk of not jumping in and proceeding as productively as possible in order to recapture its investment. Thus, a delay scenario is not a strong possibility.

What Technology is Included?

Comprehensive and broad though it is, the definition of technology incorporated into the Convention does not include processing, marketing or transportation technology [118].
Developing country representatives earnestly sought the inclusion of these varieties, but they were deleted as not being unique to seabed mining. In particular, developed nations did not want to assist developing country land-based producers of metals contained in the polymetallic nodules by providing them with processing technology.

As agreed upon under the current Convention, technology encompasses:

... the specialized equipment and technical know-how, including manuals, designs, operating instructions, training and technical advice and assistance, necessary to assemble, maintain, and operate a viable system and the legal right to use these items for that purpose on a non-exclusive basis [119].

This definition focuses on those aspects of the technological process necessary for ocean mining that are not available on the open market. The requirement that training of personnel be promoted is further strengthened by Article 15, which calls for the contractor to draw up training programs for personnel of the Authority and developing states [120].

Confidentiality of Data

The transfer of data provisions in Article 14 impose additional obligations on the operator. This article requires the transfer of non-proprietary data relevant to the work of the Authority, such as those necessary for promulgation of rules regarding environmental protection and safety [121]. These two areas specifically are deemed to be per se non-proprietary in nature [122]. Data submitted to the Authority are to be held in the strictest confidence, no disclosure outside of the Authority being tolerated. Likewise, data given to the Enterprise with regard to the reserved sites may not be revealed outside of the Enterprise, not even to the Authority [123]. Persons on the staffs of either the Authority or the Enterprise may not divulge any industrial secrets or data of a proprietary nature or they will be subject to reprimand from a special tribunal, possibly leading to their dismissal [124].

The weak "teeth" of this sanction do not comfort the developed nations worried about adequate and effective protection for their costly investments and resultant processes. They feel that staff members would certainly risk mere dismissal in return for lucrative rewards for a bit of marine industrial espionage or leaking of proprietary information. A possible stronger sanction would have been for nationals to be subject to criminal prosecution for confidentiality violations.

Miscellaneous Provisions

In addition to the technology transfer scheme as such, a well-defined system of "user charges" applies to the operator of a seabed mine. These financial terms are outlined in Article 13 [125]. Annex III also manages to incorporate the concept of
Redus sic stantibus (the doctrine of changing circumstances) [126] in its recognition that a time may arise when either party to the mining contract -- that is, the operator or the Authority -- feels circumstances have evolved, or may yet evolve, that render the contract inequitable, impracticable or make impossible the achievement of the original contract objectives. In this instance, the parties shall enter into negotiations anew to effectuate necessary adjustments [127]. This concept creates significant opportunity to keep abreast of technological improvements. The article, however, fails to create any obligation actually to reach agreement on new terms. It is unclear what happens if no agreement is reached. Perhaps the review structure built into Part XI of the Convention may serve to fill some of these textual holes.

Further limiting the operator is the prohibition of transfer of its rights arising out of the contract without prior consent of the Authority [128]. Such permission is not to be unreasonably withheld, reasonableness being based on an evaluation of whether the proposed transferee is in all respects a qualified applicant and whether it will assume all the obligations of the original operator [129].

Penalties that can be imposed on an operator that refuses to abide by the prescribed rules and decisions of the Authority include suspension or termination of rights under the contract, monetary penalties proportionate to the seriousness of the offense, and prejudice to consideration for approval of future work plans and proposals [130]. Suspension or termination shall occur only for serious, persistent and willful violations of the fundamental terms of the contract or if the operator fails to comply with a final, binding decision of the applicable dispute settlement body. Monetary sanctions are to be awarded in lieu of suspension or termination. In each instance, except for emergency cases [131], the Authority may not punish an operator until the operator has had a reasonable opportunity to exhaust remedies available under Part XI [132].

By virtue of its compliance with the provisions in Article 5 and related articles, the operator obtains an exclusive right to exploit the area covered by the plan of work in respect of a specified category of minerals (which is totally dependent on existing resource production policies of the Authority at the time of application). It is also guaranteed that no other operator active in the same area, although for another category of minerals, will interfere with its operations. Finally, the operator is given security of tenure [133].

CONCLUSION

Neither side gained all of its goals in the decade-long debate over the technology transfer provisions that govern seabed mining. The developing states wanted to (1) extend the time-limit on the transfer obligation, (2) strengthen further the obligation to transfer third party technology, (3) enlarge the definition of technology to include processing, marketing,
and transportation technology, and (4) obtain more assurances that the contractor would comply with its commitments [134]. The developed states not only opposed each of these goals, but themselves wanted greater protection of proprietary interests and protection of preparatory investment [135]. This latter desire was partially satisfied in the form of the PIP Resolution adopted in the spring of 1982. Now that the negotiations have been concluded, it will be seen how the agreed-upon provisions work in actual practice.

The United States wanted to avoid setting any precedents in the Convention on the Law of the Sea that might establish a precedent for other international negotiations [136], and vigorously opposed the mandatory seabed provisions for this reason. The U.S. delegation also wanted to take advantage of the technological edge held by Western corporations to gain as much access to the important minerals in the polymetallic nodules as would be possible. Although the Convention was adopted overwhelmingly without concession to the United States on these issues, several other important changes were made [137] and the PIP Resolution gives the Western consortia some significant advantages and provides an incentive for the Western nations to sign and ratify the Convention.

It seems unlikely that the huge investments necessary to begin mining the nodules will be made outside the framework of the Convention's rules, because a consortium claiming a site could not be assured of being able to remain at that site undisturbed for long enough to recoup the investment. Such a free-for-all approach would not work in the interest of the major maritime nations, because it would encourage coastal states to claim ocean space out to a mine site and might lead to the evolution of new customary international law recognizing extended zones of national jurisdiction that would include the deep oceans adjacent to the exclusive economic zone [138].

The mandatory technology transfer provisions are onerous if given the "worst case" interpretation raised hypothetically by the U.S. negotiators during the spring 1982 negotiating session [139]. These provisions are susceptible to a more reasonable interpretation, however, and if the United States and the other developed nations participate actively in the Preparatory Conference they could help ensure that the interests of the private investors are understood when the details are worked out.

The developing nations have grown accustomed to asking for technology transfer for investments within their countries. In 1970, the world appeared to have decided that the resources of the deep seabed were the "common heritage" of humankind and that special provisions were to be made to ensure that the developing nations would benefit from the development of this resource [140]. The delegates at the Third United Nations Conference on the Law of the Sea translated that decision into the technology transfer provisions that now appear in the text of the Convention.
Investment is still continuing actively in the developing world despite mandatory technology transfer requirements, because the investments make economic sense even with these requirements. It is probable that after the private economic interests in the developed world take a long hard look at the completed Convention, they will likewise conclude that it makes more economic sense to invest in seabed mining within the framework of the International Seabed Authority than to proceed under the uncertain protection of the few Western nations that did not join in supporting the Convention.

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NOTES

the Establishment of a New International Economic Order, G.A. Res. 3202, 6 U.N. GAOR Special Supp. (No. 1), U.N. Doc. A/9559 (1974). The Declaration calls for recognition of State's permanent sovereignty over their natural resources, regulation of multinational corporations, preferential treatment for LDC's, access of LDC's to technology possessed by the West, and rights to nationalize foreign-owned property when deemed necessary by the local authorities.

4. Charter of Economic Rights and Duties of States, G.A. Res. 3281, 29 U.N. GAOR Supp. (No. 30), U.N. Doc. A/9631 (1974) (hereinafter cited as CERDS). Article 13 of CERDS specifically recognizes the need for LDC's to acquire technology on terms appropriate to their own capacity to pay for and benefit from such transfers. CERDS was not accepted by the United States and other OECD states, even though adopted 120-6-0.

5. Transfer of technology alone clearly will not solve the problems of the developing world. Transfer of technology is useless without adequate capital and resources. The way a nations organizes its economy may also be relevant. See, e.g., Chapman, Underwater Plunder, The New Republic, Apr. 21, 1982 at 19.


9. Id. at 177.


13. Patents and trademarks are the main legal instrument utilized in regulating industrial proprietary technology. The International legal regime of the Paris Convention on the International Union for the Protection of Industrial Property of 1883 (21 U.S.T. 1583; 24 U.S.T. 2140; T.I.A.S. No. 6923, 7727) influences most countries' approaches to patent regulation. Over 100 nations are parties to this Convention today. The Paris Convention regime reflects the underlying premise that a patent will be granted to an inventor, protecting his invention from being used or copied by others, as a means of encouraging public disclosure of scientific advances. The period of protection is limited in duration, at the end of which the technology is in the public domain. The Convention set out a scheme whereby foreign inventors could be granted open access to national markets in other States. This system has, however, backfired for the developing countries. All but a few of the world's patents are in fact owned by persons or corporations in the developed world. Because these patents are not required to be actually worked and because the patents are protected for substantial periods (often 17 years), corporations can control technology and markets in many developing nations where patents have been registered. For a general overview of the International patent structure and an examination of Third World attitudes toward the existing system, see Jayagovind, The International Patent System and Developing Countries, 20 Indian J. Int'l L. 47 (1980); UNCTAD, The Role of the Patent System in the Transfer of Technology to Developing Countries, U.N. Doc. TD/B/AC.11/19/Rev. 1 (1975); UNCTAD, Report of the Group of Governmental Experts on the Role of the Industrial Property System in the Transfer of Technology, Annex V, U.N. Doc. TD/B/C.6/AC.3/4, Add. 1 (1977).


16. Conboy, supra note 12, at 76 and 78.

17. One example is the four-fold increase in developing country payments deficits from 1973-74 triggered by the oil situation during these years. See Stephen Minikes, (Senior Vice President of Export-Import Bank of the United States), remarks at the 1977 American Bar Association Workshops, cited in Brown, Changing the Rules: International Law and the Developing Countries -- The ABA Workshops of 1977, 12 Int'l L. 265, 271-3 (1978).

19. The scenario is analogous, albeit not identical, to the post-World War II situation in which the Marshall Plan was implemented. United States' generosity in giving other nations access to our skills and in transferring massive doses of technical and financial aid may have contributed somewhat to the economic superiority of the U.S. being challenged by Japan and West Germany, two of the recipient nations. Nonetheless, the creation of a stable world economy and development of world markets for U.S. goods has also resulted in tremendous competitive advantages for U.S. firms. Unless we adopt radical changes in our lifestyle, our present situation of resource dependence on foreign nations requires that we listen to the concerns of the Third World with extremely attentive ears. This dependency dilemma exists for the rest of the developed world as well. Failure to modify our behavior could be fatal since the potential for resort to violence on a large scale in order to protect unstable sources of raw materials is very real.

22. See Junta, supra note 7, at 48-9.
23. Of course, Japan has had solid financial backing and security assurances from the U.S. allowing it to concentrate its scarce available resources on economic development. Japan's historical tradition of borrowing from China and other cultures has also made the adoption and adaptation of foreign technology all that much easier. Nonetheless, its screening procedure has certainly aided and accelerated the process.

25. Parker, supra note 21, at 412-413.
26. Between 1961 and 1968, Latin America had a deficit on current account in its balance of payments. In its trade balance, in 1968, Latin American exports totalled $12 billion, and imports were $10.6 billion, giving an initial surplus of $1.4 billion. But adding a deficit of $3.6 billion for services, investment charges (flows for services, insurance, return of capital and services on debt), gave Latin America an overall trade deficit in 1968 of $2.2 billion. The Latin share of world markets dropped from 7.2% in 1961 to 6.7% in 1968. Ironically, during this period in which foreign investment was increasing in Latin America, Latin America's market share had dropped. Mirabito, supra note 6, at 217.
27. Mirabito, supra note 6, at 232.
29. Mexican Law on the Registration of the Transfer of Technology and the Use and the Exploitation of Patents and


31. Mexican Technology Transfer Law, supra note 29, at art. 2.


33. Id. at 234.

34. Soberanis, supra note 30, at 27.

35. Hyde & de la Corte, supra note 32, at 234. Article 7 provides that the Ministry of Commerce and Industry shall not register acts, agreements or contracts which meet any of the following criteria:

I. When their purpose is the transfer of Technology freely available in the country, provided this is the same Technology;

II. When the price or consideration does not represent the Technology acquired or constitutes an unjustified or excessive burden on National Economy;

III. When provisions are included which permit the supplier to regulate or intervene, directly or indirectly, in the administration of the transferee of the Technology;

IV. When there is an obligation to assign onerously or gratuitously to the supplier of the Technology, the patents, trademarks, innovations or improvements obtained by the transferee;

V. When limitations are imposed on technological research or development by the transferee;

VI. When there is an obligation to acquire equipment, tools, parts, or raw materials exclusively from any given source;

VII. When the exportation of the transferee’s products or services is prohibited, against the best interests of the country;

VIII. When the use of complementary technologies is prohibited;

IX. When there is an obligation to sell the products manufactured by the transferee exclusively to the supplier of the Technology;

X. When the transferee is required to use permanently personnel designated by the supplier of the Technology;

XI. When the volume of production is limited or sale or resale prices are imposed for domestic consumption or for exportation;

XII. When the transferee is required to appoint the supplier of Technology as the exclusive sales agent or representative in Mexico;

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XIII. When an unreasonable term of duration is established. Such term shall in no case exceed 10 years, obligatory for the transferee;

XIV. When the parties submit to foreign courts for decision in any controversy in the interpretation or enforcement of the foregoing acts, agreements or contracts.

Cited in Soberanls, supra note 30, at 21.

36. For example, the contract must specify the payments to be made by the proprietor—i.e., must state a basis for consideration. A comparison of payments made in similar contractual arrangements in Mexico and abroad is carried out with the assistance of the National Board of Science and Technology. Soberanls, supra note 30, at 23-4. Ties-ins are allowed only when raw materials are not available locally or when the supplier guarantees to charge prevailing international prices for industrial materials provided. Finally, "only an outright sale, as opposed to a mere license for the temporary use, of technology is permissible, and ... such sale is required to be fully consummated within the shortest practicable period of time." Hyde & de la Corte, supra note 32, at 238. Under this reasoning, only when the supplier can show that the technology recipient is acquiring genuinely new technology will contracts be renewed. Jeffries, supra note 28 at 321, citing Camp and Rojas-Magnon, Recent Developments Under the Mexican Foreign Investment Law and the Law Regulating the Transfer of Technology, 8 Lawyer Americas 1, 16 (1976).

37. Hyde & de la Corte, supra note 32, at 251. The authors explain this phenomenon by reference to the following report:

According to information published in the monthly organ of the Mexican National Foreign Trade Bank (Banco Nacional de Comercio Exterior), 5625 technology agreements were submitted to the Ministry between January 29, 1973 and April 30, 1974. Of these, 4112 were agreements in existence on January 29, 1973 submitted so that the Ministry could take note of them, and 1513 were new agreements submitted for registration. Of the latter number, 834 had been formally acted upon by April 30, 1974, of which 535, or 64%, had been denied registration for one or more reasons set forth in the Technology Law ... As of April 30, 1974, almost one-third of the technology agreements denied registration in the first instance had been granted registration, and the majority of the remaining two-thirds were in the process of renegotiation. A petition for reconsideration had been filed with respect to only a very few.
No less than 39 specific offenses are listed as well as a general clause prohibiting those practices imposed as conditions for obtaining required technology which would have an adverse effect on the recipient enterprise. Per se illegal practices include: tie-ins, restrictions on recipients' volume and scope of production, export prohibitions, grant-backs to the proprietor of inventions by the licensee, and limitations exceeding the scope of the licensed industrial property right. See Goldscholder, Assessment and Contractual Arrangements of the Acquisition of Foreign Technology by Developing Countries, Current Trends in Domestic and International Licensing, 490-1 (1976).

41. Conboy, supra note 12, at 78.


47. See Van Dyke and Yuen, supra note 43, at 501-8.

50. 1970 Declaration of Principles, supra note 42. (emphasis added)
52. Charney, supra note 45, at 59.
54. ld., art. 268.
55. ld., art. 269.
56. ld., art. 274.
57. ld., art. 275, 276.
58. ld., art. 267 (emphasis added).
59. See, e.g., Breaux supra note 18, at 22.
62. ld.
64. ld., art. 170. The Enterprise is the Authority’s operating arm.
65. ld., art. 153.
66. ld., Annex III, art. 3-5.
68. Donkers, Equipment for Offshore Mining, 2 Marine Mining 213 (1980).
69. ld. at 225.
70. ld. at 227.
72. The four consortia that have been in existence for the longest period of time are:

1. Kennecott Consortium;
2. Ocean Management Inc. (OMI);
3. Ocean Mining Association (OMA); and

The Kennecott group is 50% Kennecott-owned and draws significantly upon Kennecott's prior mining experience from copper activities. The basic device in contemplation for extraction involves use of a single towed mining head with an in-line pumping system. Arthur D. Little, Inc., Technological and Economic Assessment of Manganese Nodule Mining and Processing (Study Prepared for U.S. Department of the Interior, Office of Minerals Policy and Research Analysis, Nov. 1979); Subcommittee Hearings, supra, at 15.

Their exact processing system has not been publicly identified, but the group is apparently leaning toward an ammonia-based cuprous ion metal extraction process.

OMI is a truly international consortium; investors from Canada, West Germany, Japan and the United States each hold a 25% stake in its operations, each party having extensive experience in the area. Sedco, the main member of the group, is a longtime ocean industries company. The basic technology being considered here is use of two separate towed mining systems. OMI's processing system is presently expected to be capable of yielding a ferro-manganese product. Subcommittee Hearings, supra, at 16.

Another major U.S. concern, U.S. Steel, is a one-third owner of OMI, along with Sun Oil and a Belgian concern. Although having no prior experience themselves, these three have arranged for a service contract with Deepsea Ventures, the group that unsuccessfully attempted to lay a claim in 1974 to a seabed site, a claim subsequently rejected. See Note, Deepsea Ventures: Exclusive Mining Rights to the Seabed as a Freedom of the Sea, 28 Baylor L. Rev. 170 (1976). OMI's technology employs a towed mining head and an air lift pumping process. Subcommittee Hearings, supra, at 16.

The fourth major consortium -- OMC -- is primarily a Lockheed Missiles and Space Cogroup. OMC has the advantage of considerable experience in research and testing with submersibles and deep water oil production systems. Id. The company's research has been directed predominantly at nodule recovery equipment, with proportionately little exploration having been done by the end of the 1970's. Id. at 17.

73. Subcommittee Hearings, supra note 72, at 17.
74. Id. at 8. In 1978 an estimate of $700 million was made. A figure of at least 40% more (accounting for a minimum of 10% increase in inflation for each of four years) is no doubt more reliable for 1982 cost estimation. The new estimate, therefore, would be $980 million.
75. Declaration of Principles, supra note 42, paras. 1 and 7.
76. Prospecting is to be encouraged (Convention on the Law of the Sea, Annex III, art. 2(1) (a)), but can be conducted only after the International Seabed Authority has been notified by the prospective prospector of its intent to abide by the rules of the Convention and of the broad area to be prospected. Id., Annex III, art. 2(1) (b). Prospecting by more than one prospector in an area is allowed. Id., Annex III, art. 2 (1)(a). Even though a "reasonable" amount of resources may be recovered by the prospector for sampling, prospecting confers no preferential, proprietary, exclusive or other rights on the prospector with respect to the resources. Id., Annex III, art. 2(2). The prospecting applicant apparently must cooperate in allowing the Enterprise staff or developing State nationals to "participate" in the prospecting in order to increase their technological bases. Id., art. 144(2) (b), incorporated by reference into Annex III, art. 2(1)(b).

77. Before a party can explore or exploit it must obtain inter-
Seabed Authority approval of a plan of work covering its
activities in the Area. Parties may apply for any part of
the seafloor, except for previously reserved sites, which are
established under Annex III, Articles 8-9. All
applications must cover an area of sufficient size to
support two commercial mining operations. The territory is
divided into two zones of equal commercial value by the
applicant. The Authority has 45 days in which to designate
one of the two halves a "reserved site" to be used solely
by the Authority, which may operate either through the
Enterprise or in a cooperative venture with one or more
developing States Parties. The zone chosen will be
designated reserved upon approval of the plan or work on
the non-reserved site by the applicant. Id., Annex III,
art. 8. In the event the Enterprise does not mine Its
site, it shall consider plans of work submitted by
developing States to carry out? activities on the site.
Id., Annex III, art. 9.

78. Id., Annex III, art. 7(3) (a-c).

132/Add. 1 at Annex IV (April 22, 1982) [hereinafter referred
to as PIP Resolution].

80. It is improbable that Japan, India or the Soviet Union will
begin commercial production in this decade. They each hope
to begin, however, no later than 1995. This lag is one
reason the Japanese fought to limit the mining area of a
pioneer site to 23,400 square miles, whereas the Western
nations wanted to explore 60,000 square mile tracts. The
final approved area was 150,000 square kilometres.

81. PIP Resolution, supra note 79, para. 1(a).

82. Id., para. 8(c).

83. Id., para. 14.

Times, May 1, 1982, at 1, col. 1 and at 19, col. 1. For an
Insight into the predisposition of Mr. Malone and the U.S. Delegation during negotiations, see Testimony of James L. Malone before the U.S. Senate Subcommittee on Arms Control, Oceans, International Operations, and Environment, Senate Foreign Relations Committee, June 4, 1981, at 4-7.

86. Id., Annex III, art. 5(2).
87. Id., Annex III, art. 5(3).
88. Id., Annex III, art. 5(3)(a).
89. Id.
90. Breaux, supra note 18, at 22.
94. Id., Annex III, art. 5(3)(a).
100. Id.
101. Id., Annex III, art. 5(3)(c).
104. Id.
105. Id.
106. Id., Annex III, art. 5(3)(d).
108. Id.
109. Id.
110. Id., Annex III, art. 5(5).
111. Id.
114. Id., Annex III, art. 11.
115. Id., Annex III, art. 7.
118. Id., Annex III, art. 5(8).
119. Id.
120. Convention on the Law of the Sea, Annex III, art. 15. See also art. 144(2).
121. Id., Annex III, art. 14(1).
122. Id., Annex III, art. 14(2).
123. Id., Annex III, art. 14(3).
124. Id., Annex III, art. 14(4), and art. 168(2).
126. As compared to the more traditional view of international law known as *pacta sunt servanda* (contracts or promises are binding as made).
28. Id., art. 20.
29. Id.
30. Id., Annex III, art. 18(1) and (2).
31. Id., art. 162(v).
32. Id., Annex III, art. 18(3). See also section 6 of PART XI.
33. Id., art. 16.
38. See Van Dyke and Yuen, supra note 43, at 547-49.
40. 1970 Declaration of Principles, supra note 42; see Van Dyke and Yuen, supra note 43, at 521-34.
The role of technology and of technology transfer in developmental strategy is complex and controversial. The two papers we have just heard are really excellent. I am grateful to have had the opportunity to read them, because they make an important contribution and will be extremely useful both to transferors and transferees.

Surprisingly, some people still look at technology transfer as if it were really an issue that does not exist. At UNCLOS III some of the negotiators, especially the U.S. negotiators, tended to say, "Well, all you have to have is some money, and then you can buy it." At the other end of the spectrum we have the view -- and I think we heard it here today -- that technology transfer really embraces the whole social system, including education and training.

Again, some people look at technology as if it were an autonomous force, a primary cause in the development process, while others, following the French school of Jacques Ellul, regard technology as some incorporation of evil, as the new form of the devil that is going to wreck our society. Still others view technology as playing an important but secondary role, second to the political order which is seen as determining technological development and transfer, and the uses to which technology is put. I myself belong to this last school. I would like to say a few words about the particular importance of ocean mining technology in the context of what now is generally called the third industrial revolution. Recently at the Versailles Summit, President Mitterand of France made what I think was the best of a series of statements, which Prime Minister Trudeau defined so merrily as weasel words. I think the Mitterand statement was very important. He listed ocean exploration technology as one of the high technology areas, along with space technology, biotechnology, electronics, non-conventional energy technology, and others, which make up this third industrial revolution. It is in these areas of new technologies that he proposes the launching of a concerted program by establishing international commissions for research and development and for technological cooperation between public and private firms and states. This is a very important suggestion.

In this same proposal Mitterand also stressed the importance of the participation of developing countries in joint ventures (initiatives co-joints) to assure the countries of the South (as he put it) the acquisition of these new technologies, which would be greatly facilitated by agreements on co-development or common research in development. I would like to return to this at the end of my comments, because it is immensely important, but the point I wish to make is that if the
developing countries do not join this third industrial revolution now, at the ground floor, at the level of research and development, the development gap 20 years from now may be too wide to bridge.

What about technology itself as part of the common heritage of mankind? It seems to me that if we declare a resource to be a common heritage, then the technology that is needed to utilize that resource must also be common heritage. The link between resources and technologies is unbreakable. Resources are what technologies make of them.

This should have been obvious to the US negotiators at UNCLOS III who kept insisting that the resource in situ has absolutely no monetary value, and that it is only the technology that gives it value. Yet, we know it was the U.S. in particular that resisted the concept that technology too should be considered common heritage. This concept does not, of course, mean that we must decapitate all the present owners of technologies or that we want to expropriate them. No, but it does mean that we should create systems whereby technologies can be developed jointly with the public sector and at the international level along the lines suggested by Mitterand.

Let me come to the Convention itself. As was pointed out, we have three levels at which technology is being dealt with. One is that of mining. The second is the processing level. Both the first and second are covered in Part XI and Annex III. The third level is that of marine technologies in general, which is covered in Part XIV. It has been observed that the provisions regarding the mining technology are the most binding of the three, although even those provisions, in the final analysis, are not really binding. Last year's chairman of the International Law Commission, Ambassador Christopher Pinto of Sri Lanka, has recently pointed out that a close reading shows that even there the technology provisions are not binding; that no court would describe them as mandatory or enforceable.

As Jon Van Dyke has noted, a worst case hypothesis has been used by some of the industrialized countries in order to bolster their objections and suspicions. But there is also a worst case hypothesis for developing countries that if they tried to enforce these provisions they would find them unenforceable. When we come to processing, of course, we find the transfer provisions are even looser. There is nothing in the Convention that really makes these provisions enforceable. And when we come to the general marine technology part, we are in the realm of exhortatory or soft law.

What is the reason for these differences in the language of the Convention? It has been attributed to oversight on the part of the developing countries, but I would like to offer an alternative explanation. The Convention is, of course, based on the awareness that all problems of the ocean are interdependent. In this sense the Convention on the Law of the Sea is a constitution for the oceans. But in matters of institutional infrastructure, constitution-building is limited to the area of deep ocean mining. For other uses of the sea, the Convention
assigns management functions to the "competent international organizations." Recently, I made it my sport to count these references to the "competent international organizations." There are 62 such references in the text. But they remain at that level.

In spelling out provisions for technology transfer, you need an institutional infrastructure. That, to my mind, is the reason we have this relative precision in Part XI, dealing with institutional infrastructure, and this vagueness, this exhortatory language, in other parts of the Convention which do not create institutional infrastructure. Yet, I do not believe that in these other parts the Convention has triggered developments which will proceed, no matter whether the Convention is generally ratified, as we hope.

Now the evolution of "competent international organizations" is in full course. These agencies are now re-examining their terms of reference, to see how far they have to restructure and strengthen themselves so as to be able to implement the Convention. I would expect that in this process stronger, more effective, binding provisions for technology transfer will be framed.

In conclusion, let me return to President Mitterand's proposal and suggest further that we should set up as speedily as possible, through the Preparatory Commission, a research and development joint venture on deep ocean explorations. I think this would be extremely useful, both for developed and developing countries: for developed countries, because it would save them money by reducing investments and spreading the risks; for developing countries, because it would be a short-cut into high technologies management.

The Resolutions on preparatory investment protection and the establishment of a preparatory commission open up unexpected horizons. Perhaps some of you have not thought of these Resolutions in that way, but perhaps this is the counter-intuitive result of these initiatives. The first aspect of this new situation is the recognition of what kind of activities will be taking place on the seabed in the immediate, foreseeable future. They will not be mining activities. We shall not see the kind of integrated operation envisaged in such lavish detail in the Convention until the end of the century. Activities in the International Area in the immediate future will be exploration and research and development activities. That is a very different scenario.

The second aspect of the new situation is that the PIP Resolution gives the Preparatory Commission powers it would not otherwise have. It has to deal with contracts for exploration and for research and development. It has to select reserved sites for the Authority. It has to make arrangements for technology transfer and the training of personnel from developing countries. It has to have operational capabilities which we did not think it would have a year ago or so.

Third, the Preparatory Commission has a flexibility now that the Authority itself does not have. This flexibility will
help the Commission in its effort to adjust the ideas of the 1970s to the realities of the '80s and '90s.

Finally, the Resolutions create an effective interim regime, which can go into effect as early as 1983, upon 50 signatures of the Convention, which we are certain to get. We don't have to wait until we have 60 ratifications, which may take very much longer -- or which we may not get at all, although it is very much hoped we shall.

The paradox is that the PIP Resolution, which we thought was a tragic concession that we would have to make to save the Convention, turns out, in conjunction with the Prep. Com. Resolution, to give us the possibility of establishing immediately an effective regime for exploration, research and development, flexible enough to permit constructive action -- with the full participation of developing countries -- with regard to technology transfer, or the co-development of technology, in the immediate future.
In discussing initiatives taken or to be taken by the United Nations in marine development, it is useful to analyze the role of international public institutions in the broader context of development initiatives. Three major trends that characterize the current thoughts on development issues have direct relevance for the role of the United Nations.

First, in the western world, increasing emphasis is being put on the role of market forces in development issues. The arguments sometimes even go so far as to imply that market forces alone are necessary, sufficient and desirable for ensuring development. Examples of this are evident in some of the pronouncements in the North-South Meeting in Cancun and in the specific case of marine development, in the "green book of amendments" and its companion entitled "Approaches to Major Problems in Part XI of the Draft Convention on the Law of the Sea", circulated during the last session of the Third United Nations Conference on the Law of the Sea. As market forces are considered to be capable of taking care of socio-economic development issues, withering of the government or similar public institutions that are viewed as interfering with market forces is prescribed as a necessary condition for development.

Second, even if the public institutions do have a place in development issues, the role of international public institutions can be minimized by a shift towards bilateral or multilateral arrangements. This is evidenced, in our specific case of marine development, in the efforts to arrive at a "mini-treaty" or a Reciprocal State Agreement in relation to sea-bed mineral development. The other strand of this trend is the effort to upgrade those international public institutions where decision-making or voting mirrors, more or less, voting in the marketplace, i.e. by dollars. The preference for the roles of the World Bank and the IMF in development issues shown by some participants of the Cancun meeting is an example of this.

Third, the prolonged "stagflation" in the developed world, which is the major source of resources for the United Nations, is also having effects on the availability of resources at the disposal of the United Nations for development initiatives.

THE UNITED NATIONS AND MARKET THEORY

With the comeback of the free market approach in the area of development, it is worthwhile to examine the role of the United Nations vis-a-vis the market. It can be argued that the UN role complements rather than contradicts market forces, that
the UN activities attempt to correct the imperfections in the market so that the latter can operate freely.

First, it is well-known that market forces, left on their own, are incapable of achieving efficient production and distribution of public goods and goods characterized by externalities. Not to speak of the broader areas of world order and peace, if one considers the resources of the International Area, marine pollution control, marine scientific research, and the establishment of infrastructure for marine development, it is evident that even these cases fall into the category of public goods or goods characterized by externalities. In other words, the social and the private rates of return and the national and the international rates of return differ in these sectors. The United Nations' efforts in aligning the differing rates of return can be viewed as facilitating the operation of market forces.

Second, markets are often -- some would argue almost always -- characterized by imperfections which are impediments to achieving optimum outcomes. One can cite numerous examples in the marine field: oligopolistic market organization in the marine mineral and fuel resources, barriers in factor movement, especially capital and management, and in marine resource development, myopic investment and consumption decisions, lack of information about marine resource occurrence, and so forth. The United Nations activities in information, research, advice and assistance to member states can all be viewed in this context as measures to correct these market imperfections and thereby facilitate the operation of market forces.

Finally, one fundamental issue which is pointed out with impeccable intellectual integrity by the free market theoreticians, but which for some strange reason tends to be totally ignored by the practitioners, is that the free market system can achieve socially optimum outcomes if, and only if, the system initially starts with a socially optimum distribution of income. The so-called Pareto optimality is, then, achieved through voting by dollars in the market place. Given the inequality in income distribution among nations in the current world economic order, some mechanism has to be found to correct the distortion in voting in the market. The decision-making mechanism at UNCLOS III which operated on the basis of consensus -- and, when all efforts to achieve consensus failed on the basis of a specified majority under a one-nation-one-vote system -- can be viewed as such a corrective measure facilitating the operation of the free market system.

Viewed in this framework, the initiatives in marine development in the United Nations system may be said to be facilitating, rather than impeding, the operation of market forces. It is axiomatic for those who work within the United Nations system, but needs to be reiterated, that the Secretariats of these organizations have very little leeway in taking initiatives in any field, that the initiatives basically have to follow legislative mandates coming from the governing bodies composed of the representatives of the member states.
Is true that there is room for initiatives within the framework of the legislative mandates, but the broad mandates themselves have to be offered by the member states.

U.N. INITIATIVES ARISING FROM UNCLOS III

General

The activities of the United Nations system in marine development are numerous and varied. The system is composed of various organizations, each focusing on a particular sector or facet of development under its general mandate. There is no single organization which alone deals with marine development; marine development activities are carried out within a network of various organizations. Of course, there are coordinating mechanisms which oversee the network and ensure complementarity and effectiveness.

Marine development, being a cross-sectoral and multidisciplinary exercise, is being dealt with, in one form or another, by most of these organizations within the UN system. For example, the United Nations Conference on Trade and Development (UNCTAD) deals with the economic, commercial, technological and legal aspects of ocean shipping and ports. The UNCTAD in the past has made studies on the economic implications of the future exploitation of sea-bed minerals. The United Nations Development Programme (UNDP) is involved in the preparation and funding of international fisheries and marine resources development projects. The United Nations Environment Programme (UNEP) has given priority to the development of plans of action for the protection of regional bodies of water. The United Nations Industrial Development Organization (UNIDO) deals with processing, packaging and preservation of marine products, shipbuilding and related engineering aspects. Among the Specialized Agencies, the Food and Agriculture Organization's (FAO) work on ocean fishery is extensive. The United Nations Educational, Scientific and Cultural Organization (UNESCO), through its Division of Marine Sciences, focuses on the development of marine science programmes and marine scientific infrastructure for member countries as well as supports certain regional marine research activities. The purpose of the Intergovernmental Oceanographic Commission (IOC) is to promote scientific investigation with a view to learning more about the nature and resources of the oceans through the concerted action of its members. The World Health Organization (WHO) is concerned with health hazards of pollution in coastal waters. The World Meteorological Organization (WMO) carries out scientific observational activities on a world-wide scale for the preparation of weather analyses and weather forecasts, including warnings for storms and cyclones. The International Maritime Organization (IMO) deals with safety aspects of ships and their construction and equipment including those used in exploration and exploitation of ocean resources. Activities of the International Atomic
Energy Agency (IAEA) include management of radioactive wastes, study of marine radioactivity, desalination and irradiation of fishery products. The International Labour Organization (ILO) is concerned with the problems of seafarers and labour conditions in the marine environment.

Recent Legislative Developments

The prime movers in the recent initiatives in marine development in the United Nations system are four recent legislative developments:

* the Convention on the Law of the Sea and the tasks for the United Nations organizations specifically mentioned in the Convention;
* the tasks for the United Nations organizations implied in the Convention;
* the Resolutions attached to the Convention; and
* the Resolution on development of national marine science, technology and ocean service infrastructures adopted by the Conference on the Law of the Sea at the 181st meeting on 30 April 1982.

These legislative mandates refrain from assigning tasks to individual organizations in the UN system, perhaps as a deliberate measure. Some of the organizations, particularly because of their experience in the formulation of treaties, anticipated these legislative developments and have already responded, or are in the process of responding, to them. The UN Secretariat, the FAO and the IMO can be mentioned as examples. Some others have carried out a thorough analysis of these legislative developments in terms of the initiatives they can take. Mention can also be made of the efforts of UNESCO and IOC in analyzing the Convention, article by article, with a view to identifying possible tasks to be carried out and initiatives to be taken in their fields of competence. Most of the organizations are in the process of identifying areas of new initiatives evolving from these legislative mandates. One crucial issue, of course, is how and to what extent the mandate-givers, who are also providers of resources to the United Nations system, match assignment of tasks with allocation of resources.

Obviously, with increased emphasis and expansion of tasks, the need for efficient allocation of tasks among the individual organizations of a multi-organization system becomes pronounced and as a corollary of this, the need for coordination is also greater. The UN system has already taken a major initiative in this connexion by starting the process of task-allocation through consultations. A Cross-Organizational Programme Analysis (COPA) on marine affairs is underway; bilateral and multilateral consultations among organizations are being carried out.
Whatever the distribution of tasks, a general identification of tasks and initiatives is an essential step. That step has been taken in the form of an analytical exercise entitled "Study on the future functions of the Secretary-General under the Draft Convention and on the needs of countries, especially developing countries, for information, advice and assistance under the new legal regime" (UN document A/CONF.62/L.76). The document identifies the functions of the Secretary-General, thereby of the United Nations, under six categories:

* Functions with respect to the establishment of the limits of coastal State jurisdictions;
* Depository and related functions;
* Administrative functions associated with the convening of meetings of states parties;
* Servicing of meetings of States Parties;
* Functions with regard to the settlement of disputes;
* Reporting function, which has a broad scope and may necessarily involve information and research activities on marine development.

The needs of member states which, in turn, prompt initiatives in the United Nations system are listed under seven categories:

* Legislation and regulation
* Regulation by specific marine activity
* Publication or notification
* Surveillance and enforcement
* Administration and organization
* Co-operation directly with other States or through international organization
* Scientific and technical capabilities

The above mentioned study focused on the Convention itself to identify areas where the United Nations system can take initiatives in the marine field. A similar analysis needs to be done for the Resolutions attached to the Convention, especially Resolution I dealing with the Preparatory Commission and Resolution II dealing with the treatment of preparatory investments.

Three paragraphs of Resolutions I and II expressly assign certain functions to the Secretary-General of the United Nations: paragraphs 1, 15, and 16. These functions are described under the following categories:

(a) Convening of the Preparatory Commission for the International Sea-Bed Authority and the International Tribunal for the Law of the Sea (Resolution I, para. 1). This includes the depository function with respect to signatures and instruments of accession, determination of the date for convening and notification of states,
determination of the composition of the Commission between
states which have signed the Convention or acceded to it,
and signatories of the Final Act, consultation/arrangements
with the government of the state in whose territory the
Commission shall meet, and consultations on whether
facilities are available.

(b) Making available to the Preparatory Commission such
Secretariat services as may be required (Resolution I,
para. 15).

(c) Bringing Resolution I, in particular paragraphs dealing
with the expenses of the Preparatory Commission and with
the Secretariat services as may be required by the
Preparatory Commission, to the attention of the General
Assembly for necessary action (Resolution I, para. 16).

A clear idea of the third category of functions of the
Secretary-General mentioned above, namely making available to
the Preparatory Commission such Secretariat services as may be
required, can be obtained from a careful analysis of the powers,
functions and tasks entrusted to the Preparatory Commission
itself. In addition to the usual functions of a body carrying
out preparatory work for the establishment of an international
organization, the Preparatory Commission for the International
Sea-Bed Authority and the International Tribunal for the Law of
the Sea shall have some special functions. These special
functions arise because the Preparatory Commission will not just
carry out preparatory work for the establishment of an
institution, it will also do preparatory work for the
establishment of a regime for resource exploration and
exploitation.

The special functions and tasks of the Preparatory
Commission can broadly be classified as follows:

(a) Preparation of such draft rules, regulations and procedures
as the Preparatory Commission deems necessary to enable the
Authority to commence its functions (Resolution I, para. 5
(g)). These draft rules, regulations and procedures,
following article 17 of Annex III, may be on matters such as
administrative procedures relating to prospecting,
exploration and exploitation in the Area: (mining)
operations, including size of area (for minesites),
duration of (mining) operations, performance requirements
(for mining operations), progress report (of operations),
submission of data (related to operations), inspection and
supervision of operations, mining standards and practices;
financial matters, including establishment of uniform and
non-discriminatory costing and accounting rules,
attribution of net proceeds to mining, incentives to
further specified objectives.

(b) Functions assigned to the Preparatory Commission with
regard to the treatment of preparatory investments under
Draft Resolution II (Resolution I, para. 5 (h)). Following
Resolution II these functions will include:
(1) Making recommendations for the early entry into effective operation of the Enterprise (preambulary paragraph);
(II) registering a pioneer investor and allocating to it the pioneer area (paras. 2 and 3). This, in turn, will involve assessment whether all data required (e.g., information relating to mapping, sampling, the density of nodules and the composition of metals in them) have been submitted to the Preparatory Commission;
(III) receiving information about any efforts to resolve conflicts with respect to overlapping claims on areas in respect of which applications are made for registration as a pioneer investor (para. 5 (a));
(iv) receiving payment of a fee of S$250,000 from every applicant for registration as a pioneer investor (para. 7 (a));
(v) certifying the pioneer investor of compliance with the provisions of Draft Resolution II (paras. 8 (a), 11 (a))
(vi) incorporating in its final report details of all registrations of pioneer investors and allocation of pioneer areas (para. 11 (b)).

(c) Undertaking studies on the problems which would be encountered by developing land-based producers likely to be most seriously affected by the production in the Area with a view to minimizing their difficulties and helping them to make the necessary economic adjustment, including the establishment of a compensation fund, and submitting recommendations to the Authority thereon (Draft Resolution I, para. 5 (1)).

(d) Establishing a special commission for the Enterprise and entrusting to it, Inter alia, the following functions:
(1) Requesting registered pioneer investors to carry out exploration in the area reserved for the conduct of activities by the Authority through the Enterprise or in association with developing States, on a cost-reimbursable basis (para. 12 (a) (1)). This, in turn, may involve entering into an exploration contract with the registered pioneer investor;
(II) designating personnel for training by the registered pioneer investor (Para. 12 (a) (11)).

It can be seen that the Preparatory Commission is entrusted with a variety of functions, most of them of a highly technical nature. The substantive Secretariat services required will involve collection and assessment of information and data, as well as research and analysis of scientific, technological, operational, financial and economic aspects of sea-bed resource development and management. They may also include promotion of specialized expertise through training, for example, and negotiation of contracts. The Secretary-General may be called on to make available any of these services.
SOME RECENT UN SECRETARIAT INITIATIVES

As mentioned earlier, the United Nations has already taken new initiatives in marine development with a view to responding to the recent legislative mandates. I would like to conclude by mentioning some of these efforts by the United Nations Headquarters.

It is well-recognized and further emphasized in the Preamble of the Convention that the issues of marine development are closely interrelated and need to be considered as a whole. The primary responsibility for the development and management of most of the existing exploitable resources and uses of the oceans falls or will fall on each coastal state. Nonetheless, because certain management problems and needs associated with the utilization of extended resource jurisdiction cut across such jurisdictions owing to the geographical proximity of states, particularly within marine regions, or to the nature of the problem, coastal states will inevitably find it useful to pursue regional cooperation in management. Studies are being initiated regarding the desirability and feasibility of ocean management programmes at the national level and potentials of co-operation in ocean management at the regional level. Emphasis will be placed in identifying the essential elements of such programmes and the appropriate scope of such programmes for developing coastal states. This is closely connected with the marine dimension in development, i.e., harnessing the existing and potential contribution of the resources within, and the uses of, the marine area to national development planning. The extent to which a nation seeks to incorporate marine resources and uses into its development process depends upon a number of factors, among them: the marine resources and space to which it has access, its priorities vis-à-vis viable alternatives and its capabilities in terms of technology, human resources and finance. The studies on ocean management, thus, will pinpoint the possibilities and constraints.

Ocean management can be conceptually divided into coastal zone management and exclusive economic zone (EEZ) management. As part of ocean management, and as an extension of the work of the United Nations in coastal zone management, programmes are being developed on EEZ management. The first initiative is the preparation of a comprehensive conceptual study and formulation of guidelines. The need at this stage is for information, for creating awareness of and familiarity with concepts and problems and activities associated with an integrated approach to EEZ development and management. Studies dealing with techniques, methodologies, experiences and conditions for EEZ development and management are being initiated. As part of preparing the EEZ management guidelines, appropriate institutional arrangements for EEZ development and management will be dealt with. Preparation for a group of experts meeting on institutional arrangements to be held in January, 1983 are under way.
In addition to this emphasis on over-all planning and management of marine resource development, the UN Headquarters is taking initiatives in redeploying its long-standing expertise in marine minerals with a view to responding directly to the recent legislative mandates. Recognizing that information and research activities on sea-bed mineral development have been concentrated in few countries and perceiving the need for synthesis of information and research results and dissemination of the synthesized conclusions among the international community, a series of nine monographs are being prepared. These monographs will systematically deal with resource assessment, technologies for exploring, mining and processing manganese nodules, methodologies for mine site delineation, methodologies for processing site selection, financial structure of a nodule mining venture, comparative costs of land-based and sea-bed mining, regulatory framework and finally, the activities of entities involved in manganese nodule resource development.

Data on manganese nodules are essential for facilitating the work of the Preparatory Commission as well as for assessing the potentials in different sea areas. The most comprehensive, world-wide public data bank is being transferred to the United Nations and by early 1983 the United Nations will be the sole operator of the data bank. Plans are being studied to expand the data bank to include polymetallic sulphides, metal-containing muds and mineral in the EEZ. At present, the public data bank has glaring gaps in terms of sea areas covered. Possibilities of filling those gaps through an internationally organized scientific cruise are being studied.

Regarding near-shore minerals, a crucial problem is the lack of readily available, standardized data on nearshore hard mineral occurrences. Work has begun on a project aimed at constructing a uniform reporting system for nearshore hard mineral occurrences and at developing a computer programme for storing, recalling and cross-checking any reported data. A trial run of the programme is being carried out in the West African region. In the future, the programme will be applied to the Caribbean and ESCAP regions. The results of this project will facilitate more effective exploration and development work on the part of governments and national and international organizations in this field.

The pre-condition for marine development is the application of marine technology. Marine technology, in the current economic order, is concentrated in the hands of few nations. Transfer of marine technology is essential for the promotion of marine development. Recently, a workshop, which brought together producers and potential users of marine technology, has been held at Headquarters investigating the efficient ways and means of transaction of marine technology. Recognizing that the transaction may have a regional dimension, in the future several regional workshops will be held. Preparation for a regional workshop to be held in Madras, India is under way.
These are just a few examples of the recent initiatives in marine development and also these reflect the initiatives in the Headquarters only. The opportunities presented by the Convention on the Law of the Sea have spurred initiatives in other areas and can be a basis for the organizations in the UN system to take initiatives in numerous areas. In concluding, it should be re-emphasized that these initiatives can be viewed as complementing, rather than contradicting, the operations of market forces.