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THE TRIPS AGREEMENT: IMPLICATIONS FOR DEVELOPING COUNTRIES

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I. Introduction

Developing countries can expect benefits of many kinds as they fully implement the TRIPS Agreement. n1 This study identifies those benefits and their corresponding financial and other costs. It also identifies means by which developing countries may reduce those costs and enhance those benefits.

This study was commissioned by the World Intellectual Property Organization (WIPO) n2 in response to a resolution of the WIPO General Assembly approved at its session in October 1995 which read, in part:

9. . . . the International Bureau should make arrangements so as to be able to respond to requests from developing countries for WIPO legal and technical assistance relating to the TRIPS Agreement and should report to the next session of the Governing Bodies in 1996 on the type and recipients of these activities; including a study conducted by WIPO on financial and other implications of the implementation of the TRIPS Agreement for developing countries. n3

The commission for this paper included a stipulation that the use of statistical data be restrained.

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Polemicists have offered disturbing views of the impact of the TRIPS Agreement, yet dispassionate research in most areas is lacking. This study seeks to contribute to the analysis of the subject by considering an array of factors. First, this study discusses macro-economic benefits and costs in conceptual terms. The experience of each country is likely to be unique and conclusions will ultimately remain empirical. Second, the study assesses the increased responsibilities for public administration. It recasts the old concepts of the mission of a patent office in the context of the vastly improved flow of electronic information and offers suggestions for costs reductions. Third, this study appraises the ability of judicial systems to enforce intellectual property rights. It offers partial remedies to overcome judicial system weaknesses as well as an approach to judicial reform in general that reaches well beyond intellectual property. Finally, a brief survey of potential sources of technical assistance is offered. Because issues far broader than intellectual property are involved, a discussion of judicial system performance in relation to overall economic development is offered. Partial remedies to help overcome judicial system weaknesses in relation to intellectual property are noted

II. Historical Roles of Intellectual Property

The evolution of intellectual property has generated a variety of supporting theories and an array of legal tools. n4 They find application particularly in open economies where there is competition. However viewed, the tools of intellectual property are designed to stimulate private activity, chiefly the investment of funds in support of the research for and development of innovation and creative expression. The development of new technology inherently bears greater risk than other commercial activity. Thus, through reduction of risk, these legal tools stimulate greater investment in the innovation process.

It has been well established that the introduction of new technology into an economy fosters considerable economic growth and enhances social welfare. The writings of Robert Solow and Edwin Mansfield, among other noted economists, have contributed to this understanding. n5 Their work has focused on the American economy, but

[*493] the same general observations probably hold true for developing economies. In fact, the impact theremay be even greater.

In recent years, the issue of intellectual property protection has been "married" to international trade. Unfortunately, for some countries, this has converted intellectual property into a matter of trade confrontation. Thought of only in these terms, the historic role of intellectual property as an invitation to investment has become obscured. If thought of, instead, as part of a nation's infrastructure, then the role of intellectual property protection as an investment stimulant can be recovered for purposes of policy analysis. n6

III. Macro-Economic Benefits and Costs

What will be the benefits and costs of TRIPS Agreement compliance for developing countries at the macro-economic level? Will there be a net deficit or surplus? Over what period of time? Will the size of the country, the openness of trade and the level of development make a difference? What other factors will condition the impact?

While exact answers are not likely, trends and orders of magnitude may be suggested. A great deal will depend on the political willingness of countries to make their intellectual property systems work well to benefit their nations. In different degrees, most developing countries will face the powerful tension between private gains derived from non-robust systems and the potential gains to the overall economy from robust protection. As Carlos Primo Braga of the World Bank, one of the leading observers, recently declared, "TRIPS is the most ambitious international agreement on intellectual property rights. The main challenge for developing countries is to transform it from a rent transfer mechanism into an effective instrument for technological development." n7 The question is whether or not developing countries will enable local firms and individuals to innovate and build up the national technology base.

Extremely poor, weakly endowed countries differ from what are now called "semi-industrialized" countries in that they are less likely to have the ability to "pirate" the intellectual property of others for private gains, and therefore have less to lose in moving to robust protection

[*494] levels. At the same time, they have a greater distance to go to achieve an effective base fortechnological development.

A fairly open trading system will be important to gaining the benefits of robust intellectual property protection. Without openness, strong intellectual property protection could produce tendencies toward less competition, whether because of investment restrictions, market size problems or other similar conditions in a closed economy. Trade makes partial substitutes more readily available, with a corresponding influence on rent seeking. In other words, robust intellectual property protection can be expected to produce maximum benefits in markets where private capital and open trade are encouraged.

Before attempting an assessment of benefits and costs resulting from the TRIPS Agreement, it is critical to observe that various levels of intellectual property protection are possible and that the TRIPS Agreement is far from the highest level. For purposes of analysis in this paper, three levels of protection are used: non-robust protection; a level which facilitates trade, as per TRIPS; and a robust level capable of investment stimulation. n8

The TRIPS Agreement presents a statement of the intellectual property standard to which all World Trade Organization member countries have made a commitment. n9 TRIPS was the product of a trade negotiation within the context of the GATT Uruguay Round. The intellectual property negotiators sought only to reduce trade friction. They did not consider investment stimulation, since that was not part of their mandate. Moreover, the TRIPS Agreement resulted from compromise among countries with strongly opposing views regarding the value of intellectual property for development. The TRIPS Agreement is in some ways an illogical package of disparate concepts.

As a result, the TRIPS Agreement does not extend the strongest possible invitation to private investors, particularly national investors (see Table 1, below). Stated in other terms, when fully implemented the

[*495] TRIPS Agreement may be of sufficient strength to assist international trade flows, but it will fall somewhat short of the historic role of intellectual property in stimulating local private activity ranging from research and development of innovative technology to the creation and expression of artistic, literary and scientific works.

Thus, in making any assessment of the implications of the TRIPS Agreement, it is probable that an ability to strongly encourage private investment in high level technology pursuits will not emerge as a major characteristic of the TRIPS Agreement. While the TRIPS Agreement establishes a common base for the world, the ability to strongly stimulate these higher levels of technology will tend to be found at higher levels of protection. Table 1 below indicates some of the major gaps between the TRIPS Agreement and a robust level of protection.

[SEE TABLE IN ORIGINAL]

While robust protection will serve best to encourage high levels of technical activity in developing countries, full TRIPS implementation will give many developing countries a considerably improved ability to stimulate particular kinds of activity generally beneficial to national economic growth and development.

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A. Dynamic Benefits - Comparative Effects

Conceptually, a trade-enhancing intellectual property system, like that of the TRIPS Agreement, will have the comparative effects shown in Table 2 below. The table's observations are crude and tentative. As noted above, a variety of conditions, such as the openness of trade policy, size of market, and general level of development, including the level of public education, will have a bearing on outcomes. The table is nonetheless offered to assist analysis and encourage research.

[SEE TABLE IN ORIGINAL]

Table 2 is intended to suggest some of the dynamics which result from shifts toward higher levels of protection. Although obviously rough

[*497] and simplistic, the table is offered to help organize an analysis. It gives considerable emphasis tothe influence of patent and trade secret protection. What price tag might be put on any one of these shifts? And what might be the aggregate effect?

Cost/benefit analysis of intellectual property protection in any country at the macro-economic level is subject to an array of assumptions and a range of approaches and is probably condemned to inclusive results. Some years from now, after robust intellectual property protection has been instituted in a particular country and its effects take hold, it will probably even then be difficult for economists to sort out what happened. Other factors and events will often have intervened to make measurements inexact.

Still, we can look for signs of changing patterns of activity. Mexico, for example, seems to present an excellent laboratory for examining the question of cost and benefit. Quite negative changes in the local system occurred in the mid-1970s. Then by stages, Mexico introduced reforms to its intellectual property system. The first turn toward stronger protection occurred in 1987, with a major step forward in 1991 and important refinements in 1994. Then the Mexican economy faltered abruptly and badly in December 1994 for reasons which had nothing to do with intellectual property reforms. Thus macro-economic analysis will probably prove difficult when empirical studies are eventually undertaken.

Anecdotal information suggests, however, that at those places from which innovation is sourced within Mexico, new things are beginning to happen. Micro-companies, which have an invention or innovation as their sole asset, are beginning to find they can attract private risk capital to advance their technology toward the market. A significant increase in biotechnology patent applications filed between 1991 and 1994 has been reported. n10 The office of the federal prosecutor has pursued numerous trade secret violations recently. Perhaps as a result, it is said that some larger Mexican companies are beginning to conduct internal research and are finding that they can lure back to Mexico science graduates who studied abroad then stayed abroad to work. Similar reports of increased technical activity are coming from South Korea which installed robust protection in 1987 and have backed it with vigorous judicial enforcement over the last ten years. n11

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What follows is an assessment of each of the factors sketched in Table 2 above as they contribute to macro-economic cost/benefit analysis of the implications of the TRIPS Agreement for developing countries.

1. Innovation

Although definable in various ways, the term "Innovation" is well enough understood. That innovation has an influence on economic growth in a particular country has been well established, as already noted. Less well understood are the ways innovation influences growth in the global setting. The movement of innovation from country to country involves complex mechanisms and the impact of those movements on growth under various conditions has been attracting valuable study. n12

By way of example, work by Robert Evenson, Keith Maskus, Belay Seyoum and others is also adding to our understanding of this process. n13 The influence of intellectual property, inter alia, in relation to knowledge generation, access, transfer and use was explored recently in a World Bank TechNet Internet forum which discussed the "Knowledge Nation." n14

2. Price Levels

When a patent law changes so that subject matter previously excluded from patent protection becomes patentable, the prices of products already in the market will not change as a result of the newly introduced patent protection. Nor will competing imitation products disappear from the market or change their prices. Because the TRIPS Agreement does not contain a "pipeline" provision, n15 only inventions

[*499] made after the law changes will be eligible for patent protection, and it will normally take some timefor those inventions to ripen into products which reach the market. Even if a "pipeline" provision were enacted, any effect on price is delayed until products then in the pipeline actually reach the market.

There is extensive literature regarding the desirability of patent protection, much of it theoretical, which is mostly focused on the United States economy. n16 Within that literature, few studies forecast how price levels in developing countries might differ after patents become available. Although a more disinterested analysis would be helpful, the Italian experience with pharmaceutical prices after 1978 is suggestive. n17 After the Italian courts ruled against excluding pharmaceutical inventions from patentability that year, the prices of pharmaceutical products rose over the next ten years, but by less than the increase in the consumer price index. n18

To some it is axiomatic, at least in concept, that prices will rise when patent-protected products are introduced. That is to say, prices will be higher than they would have been had there been no patent protection. n19 The ability to exclude others from the invention would

[*500] seem to point in this direction. Yet there are important constraints on upward price movement. One is competition, while another is the threat of competition.

It has been noted by more than one observer in a major developing country that "pirates" have been known to fix prices among themselves, producing prices under a non-robust system of protection that are higher than might be expected from imitation products. It is difficult to research this phenomenon, of course, without clear evidence of price fixing. To the extent it is true, higher prices may not be a significant consequence of compliance with the TRIPS Agreement. n20

Under a patent system, others are free at any time to offer a better or different product or process which serves the same market. This often happens. If medicine T is patented and cures ulcers, others cannot make and sell T. But if medicine Z, also patented, cures ulcers, the patent for T cannot exclude medicine Z from the market for ulcer treatments. Conversely, the patent for Z cannot generally preclude medicine T from serving the ulcer treatment market. Thus, patents serve to stimulate competition at the point of research. The effect on price levels is one of constraint.

Prices may rise to a level where inferior products are preferred by enough customers that price restraint occurs. Examples of this are numerous, but quantitative analysis is scarce.

Patents last only for a fixed duration, which is now twenty years from filing the application in most countries. When the patent term expires, others are free to copy the product or process. Thus, toward the end of a patent term, future marketing considerations will often prompt price reductions.

The role of patents in many industries is not price enhancement but primarily to defend against immediate copying. The patent frequently stimulates investment in innovation, not because it offers an expectation of higher price levels, but because it offers assurance that others cannot immediately copy a successful product or use a successful process. This role for patents is characteristic, for example, of the

[*501] electronics and automobile industries. The patent will often cover a component or configuration within the final product and thus have a masked and limited effect on price.

Nonetheless, there will be situations where the introduction of patent protection may lead to upward price level adjustment in some industries, particularly those which are highly patent sensitive and where a single patent carries its effect through to the final product, such as in the pharmaceutical and agricultural chemical industries.

The portion of any economy which will be affected in this manner is limited. In Argentina, for example, the total pharmaceutical industry accounts for less than 1.5 percent of the nation's economy, and well less than half of that would eventually be protected by patents. If there were an upward price movement of, say, twenty percent or even more for the eventually patent-protected portion of this industry, the macro-economic impact would be barely discernible.

These observations on the effects of patents can be taken further. Decisions of the United States Supreme Court rendered before about 1970 contain statements that patents are monopolies. n21 More recently, the Court's opinions have shifted to the view that patents offer rent seeking opportunities, rather than monopolies, an altered perspective derived from a closer economic analysis of patents. n22 This rent seeking helps allocate resources efficiently, and at the same time generates growth-producing technology. It has been further noted that the doctrines of patent law both narrow and constrain the patent grant in a variety of ways which limit the rent seeking opportunity. n23

Whether, as suggested in Table 2, the prices of formerly "pirated" products will encounter greater local competition and thus downward pressure under an investment-oriented system, as compared to the trade-enhancing TRIPS model, may depend on factors such as the size of the market and government price control policies. n24

Market size today may involve looking at the market within a free trade area, such as the European Union, the North American Free Trade Agreement (NAFTA), the Association of Southeast Asian Nations (ASEAN) or MERCOSUR. n25 The larger the market, the more likely that

[*502] competitors will find it worth their while to enter, even with inferior products, thus tending to forceprices down.

The analysis of price levels with respect to copyright rather than patents involves somewhat different considerations, particularly if transition provisions extend protection to works created prior to the law change. Prices may then advance when the law changes and is enforced.

3. Technology Acquisition

Under a non-robust system of intellectual property little proprietary technology is likely to be acquired for three reasons.

First, most kinds of technology will not be willingly provided by their originators either through sale or license if their release into a non-protective environment places them at risk of loss to competitors. This is particularly true of any supplier's latest and best technology. n26 Suppliers' concerns can be overcome if the recipient has some means to protect the technology from loss without recourse to intellectual property protection. For example, it may be possible to subdivide the technology in such a way that only a few trusted employees or family members have access to the complete package of technology. n27 For a non-robust environment, however, the tendency will be for suppliers to limit their willing transfers to older or less competitive technology.

There will be a companion effect where willing transfers of technology are made to a non-robust country. The cost of the technology acquisition will tend to be higher to the extent the supplier anticipates risk of loss and builds a cushion into the price in response.

Second, some technology can be acquired without the willing participation of the supplier or the originating source of the technology, but there are limits to the kinds of technology which can be acquired and limits on the uses to which it can be put. Most process technology falls into this category. To be sure, several obvious examples suggest that some products are easy to acquire things like pharmaceuticals and

[*503] software. Yet while such products may be acquired by copying, the technology from which those products are derived is not usually acquired in the process. Moreover, the skills needed to copy are often not the same skills needed to practice the technology underlying the products.

Third, even technology which is otherwise freely available from foreign sources may not be appropriated and developed for local market by local firms or individuals. This is because, if these firms or individuals are without the means to protect the results of their appropriation from local copying, they are unlikely to have much incentive to build up the necessary human skills and will be unwilling to invest their time and money in such a venture.

Technology enters many countries when it is embodied in imported machines and equipment. Reverse engineering can reveal the embodied technology, but suppliers are nonetheless willing to commit these products to non-robust markets because the capital costs for others to enter those market are large enough to reduce their risk of loss to competitors.

The TRIPS Agreement will provide sufficient protection to encourage the willing transfer of some technology, whereas a robust, investment-oriented intellectual property system is likely to facilitate a greater volume of willing transfers and greater adaptation and application of that technology to local conditions.

The cost of increased technology acquisition will probably be the major cost implication of the TRIPS Agreement. This cost has two distinct components. One is the increased cost of technology (not products) previously obtained, if at all, by unauthorized copying or imitation under conditions of non- robust protection. The other component which probably involves larger costs, encompasses payments for technology which could not be copied or imitated where that technology was not previously available to the country from willing suppliers under conditions of non-robust protection.

This latter component of payments for technology can be viewed positively or negatively. It can be a gain for the country in as much as the introduction of new technology is thought to boost economic growth in general. The acquisition of new technology often stimulates local technicians to advance their work and develop new technology. n28

In a sense, a country gets what it pays for. Private parties who negotiate for access to technology will seek value equivalent to their

[*504] payment. If an error is made, it is not likely to be repeated. Some years ago, the director ofMexico's technology transfer registry observed that while stringent controls on acquisition of foreign technology had saved Mexico millions of dollars in royalty payments, the county had not received technology which would have helped modernize the industrial base and made more competitive Mexican products available at a lower cost.

4. Human Skills Development

In Brazil and elsewhere, it is not uncommon for students to enter universities intent on careers in science only to abandon that intent by their second year as they learn how limited their career opportunities will be. Where large local companies cannot effectively protect their own technological development from loss to competitors, they have little incentive to invest in employee skills improvement. The tendency to subdivide sensitive technology to better safeguard it means recently employed science graduates are consigned to secondary tasks rather than given exposure to the company's research program. Graduates thus can aspire to future careers in (typically underfunded) government laboratories or in university teaching, or go abroad to find work.

There is a threshold in protection which must be reached before local companies will become willing to invest much in training and internal research and development of products and processes. It is not clear yet whether the TRIPS level of protection reaches that threshold. In the patent area, the ample leeway for compulsory licenses which reduces the effect of a patent, among other factors, may place TRIPS short of the threshold. Still, some firms are likely to be stimulated to greater investment by even the TRIPS level of protection.

After a nation's intellectual property system has crossed that threshold of protection, the willingness of companies to invest in employee development at higher skills levels becomes almost an imperative. Some anecdotal information from several developing countries points in this direction.

5. Private Investment in Research

The stimulus of intellectual property to investment is not perfect. Yet in countries with robust protection, the stimulus can be seen to encourage private investment in research which seeks innovation.

Conversely, countries with non-robust protection tend to experience little private investment directed to innovation. In recent

[*505] years, the leading European economies, Japan, and the United States have tended to spend something onthe order of 2.5 percent to 3.5 percent of Gross Domestic Product (GDP) on research and development. Countries with non-robust protection typically spend less than one percent on research and development, with the greatest share coming from government resources.

The shift toward private investment in research in South Korea is instructive. The law changed dramatically in 1987 and judicial system response has taken firm hold in recent years. As a result, Korea's intellectual property system has achieved robust protection. Table 3 shows patent applications filed in five countries between 1984 and 1993, the latest year for which comprehensive statistics are available. The increase in Korean filings by residents has been striking over the period, rising to about 45 percent of the total applications in 1993.

6. Science in Agriculture

In many developing countries, the agricultural base is dominant in the economy. The ability to apply new science to agriculture is increasingly influenced by intellectual property protection for two reasons.

First, the traditional role of government as the primary supplier of science for agriculture is diminishing, largely because of budget constraints. Second, much that is new in agriculture is being derived from biotechnology, and much of this work is being done in private companies.

The traditional role of government in supplying science to farmers had to do largely with methods which tend to be non-proprietary. Education was the core of the service, although improved seeds and livestock were also provided. These improved life forms came from traditional research, chiefly the selection of the best plants and animals for breeding, cross-breeding and hybridization.

The contribution of biotechnology to improving plants and animals above the level of the microorganism is growing rapidly. Transgenic plants and animals already are making an impact on markets. It can be anticipated that before many years, commodity crops which compete in international markets will be differentiated through genetic engineering, so that products from some countries will be superior to those from others.

Since this work is being done largely in private companies, it may be that countries with robust intellectual property systems will be better able to stimulate this kind of research. Whether transgenic products from such countries will rapidly reach other

countries may be in question.

[*506] Companies may be reluctant to market such product in countries which cannot offer an adequate protection.

The possibility of imitation and copying may be limited for plants and even animals, since soil, disease and climate conditions tend to be particular to each country or region. Because of these conditions, work on transgenic agricultural and aquacultural products is best done locally. Whether private investment will be forthcoming and whether the related human skills will be developed will be influenced by the level of intellectual property protection in a country.

The TRIPS Agreement states without further elaboration that "Members shall provide for the protection of plant varieties either by patents or by an effective sui generis system or by any combination thereof." n29 Animal varieties are not mentioned. In the absence of further elaboration, it is difficult to project the effect of TRIPS on agricultural research. If only the minimum requirement is adopted, traditional methods will gain protection, but use of the tools of biotechnology will not be stimulated. Thus, it is likely that only a robust, investment-stimulating level of protection which offers both will fully support the application of the best new science to agriculture.

7. Industrial Base

To the extent that the level of intellectual property protection influences the industrial base of a country, the characteristics of the industrial base appear to change in important ways as a country shifts from a non-robust system to higher levels of protection.

The extent of that influence may be greater than is generally recognized. Mansfield, in ground- breaking empirical work for the International Finance Corporation of the World Bank Group, n30 studied the influence of intellectual property on private investment, joint ventures and technology licensing in 16 countries: Japan, Spain and fourteen leading developing countries. n31 His findings were drawn from questionnaire responses received from ninety-four American, thirty-two Japanese and twenty German corporations selected from six manufacturing industries: machinery, metals, processed foods, electrical

[*507] equipment, transportation equipment and chemicals (including pharmaceuticals). The survey wassupplemented by interviews with some of the companies' representatives.

Mansfield found that:

the strength or weakness of a country's system of intellectual property protection seems to have a substantial effect, particularly in high-technology industries, on the kinds of technology transferred by many U.S. firms to that country. Also, this factor seems to influence the composition and extent of U.S. direct investment there, although the size of the effects seems to differ greatly from industry to industry. n32

Further, Mansfield also found that:

in relatively high-technology industries like chemicals, pharmaceuticals, machinery, and electrical equipment, a country's system for intellectual property protection often has a significant effect on the amount and kinds of technology transfer and direct investment to that country by Japanese and German, as well as U.S. firms. Also, when a variety of relevant factors are held constant in an econometric model, the effects of such protection on U.S. direct foreign investment are substantial and statistically significant. n33

In this study, Mansfield asked the reporting firms to differentiate among the following types of industrial activity: sales and distribution; rudimentary production and assembly; component manufacture; manufacture of complete products; research toward and development of products. For some industries, intellectual property was important at each of these levels of activity, while for other industries only the higher levels of activity were influenced by the level of a country's intellectual property protection.

As Table 2 depicts, the characteristics of a country's industrial base appear to center on sales and distribution, assembly and component manufacture in countries with non-robust intellectual property protection. Countries with systems in the vicinity of the TRIPS Agreement norms will, in addition, experience low level industrial activity where the technology is known and practiced by most companies in that industry. "Pirate" companies will be displaced, as well, by imports, but this will not mean their destruction. n34 Countries with robust intellectual property protection tend to experience an on-going stream of new, high-

[*508] technology firms entering the industrial base, with older firms adapting to newer technology. n35

8. Private Risk Capital

Venture capitalism lists robust intellectual property protection as its first requirement. n36 The power of private risk capital to seek and promote promising new technology is widely recognized. Whether venture capital firms specialize in a particular field of technology or operate broadly, their presence in an economy radiates a positive influence among individuals who aspire to make inventions and bring them to the public. The expectation that risk capital might be available to help launch a micro-company has kept many a technical genius working nights and weekends.

The risk of bringing a new technology to commercial feasibility is great enough without adding the risk that, once success can be foreseen, others will "pirate" the result. Venture capital picks carefully among candidate start-up firms. If the risk of pirating is more than nominal for a particular start-up company, the venture capital firm will reject its solicitation for investment funds.

In countries with non-robust protection, little private venture capital will be available. For countries with protection at a parity with the TRIPS Agreement, some risk capital may materialize, although it will not be strongly encouraged. A country which adopts a robust system will be able to encourage optimum risk capital activity.

9. University Technology

Whether their science programs are weak or strong, the universities in most developing countries provide a focus for bright minds and are a potential source of new technology, particularly technology which fits local conditions. Yet university research in these countries tends to be at high theoretical levels, with applied science not attempted and often disdained. One of the impediments to launching university-sourced

[*509] technology into the local economy will be non-robust intellectual property protection.

There are, of course, examples of university research results being published and then freely utilized by private companies. Still, willingness to indulge in the further research and development work needed to prepare raw university inventions for the market is normally hindered by the lack of protection.

Today, university policy usually requires that inventions made by researchers in campus laboratories be disclosed to university administrators who judge the commercial potential of the invention and, if appropriate, apply for patent protection. This policy does not preclude publishing news of the invention. It usually only means that the patent application must be filed before the publication is made.

Some universities today go further. They will seek or even help to organize companies which are willing to purchase or license the invention from the university. It is common for universities to pass a portion of any income received from this activity to the inventor and to the inventor's department to fund further research. This income can be an important supplement to the normal sources of university financing, particularly in a developing country.

An important lesson learned in United States universities is that, when research results are made available to anyone on a non-exclusive basis, there is little demand for those results. Only after federal legislation changed in 1980 to allow access to university research results on an exclusive basis did private companies take a strong interest in gaining access to university research results.

Transfer of university technology reached a level where, by one calculation, some $ 3 to $ 5 billion of American GDP in 1992 originated from university licensed products, processes and services. A point repeatedly made by the technology transfer office at the Massachusetts Institute of Technology is that MIT seeks vigorously to transfer university technology, not for the income which this may bring to the university, but to assure that the university's research gains usefulness by contributing to the national economy. Without technology transfers, university research results contribute to the wealth of the library but not the economy.

In countries with non-robust intellectual property systems, the potential for university technology transfers is restricted. Under a TRIPS regime, the potential is increased, but the continuing weakness of the value of patents under this level of protection will still restrict private interest in university research results. The experience of Europe, Canada, Japan and the United States shows that under more robust intellectual

[*510] property regimes, transfers of university technology to public use can reach a high potential.

B. Summary: Macro-Economic Impacts

The aggregate of the foregoing considerations would seem to be noticeable but probably cannot be quantified for any given country with any worthwhile degree of accuracy, even after the fact.

Except for payments for acquired foreign technology, most of the costs resulting when protection is increased to the level of the TRIPS Agreement will be relatively minor in relation to the overall size of most economies although some smaller economies may experience a greater negative impact.

Even significant payments for acquired foreign technology may have a direct offset. Rahn indicates that the Japanese spent willingly to acquire proprietary foreign technology after World War II. n37 The resulting benefits in terms of stimulation for their technicians and scientists and the ability to then advance their own technology were remarkable. Perhaps the lesson is that it is worth buying foreign technology in order to enhance growth and development.

Most of the benefits to be derived from higher levels of protection will not be felt immediately and their magnitude will depend importantly on the level and quality of the protection ultimately adopted. The TRIPS level of protection will produce fewer benefits than a more robust, investment- oriented level of protection.

Still, the TRIPS level should be sufficiently stimulative to make some difference, particularly for international trade flows and associated activity. For local companies which must function largely within the local setting for the origination of their technology as well as its development, production and commercialization, a higher level of protection would be more encouraging.

On balance, it appears that the impact of the TRIPS Agreement on most developing countries is likely to be slightly negative in the short run (one to two years) and increasingly favorable as local firms and individuals begin to realize the potential benefits for their activities. Public education will play a role in the speed with which the benefits are realized. Naturally, conditions such as inflation, taxation, tariffs and other macro-economic policies will dominate private decision-making

[*511] and the performance of the judicial system, discussed below, will have a major influence.

IV. Public Administration n38

As countries improve their intellectual property systems in response to the TRIPS Agreement, a greater burden is being placed on public administration in many developing countries. This will be particularly true for the patent, design and trademark functions, and perhaps also for the protection of new plant varieties and integrated circuit layouts.

If each country were to rely only on its own resources, the increased administrative burden might be difficult to sustain effectively, particularly by developing countries. However, the use of new technology, the application of new approaches to traditional mandates, and the utilization of international cooperation and assistance are available to help deal with the increased responsibilities. Moreover, most aspects of the increasing burden will be offset by corresponding fees collected from those who use the various intellectual property systems. The sources and types of assistance available from international sources are discussed later.

A. Current Context

The increasing burden of public administration stems not only from the TRIPS Agreement. Three more general trends are influential. First, there is the global expansion of scientific and technological knowledge and the expansion of international trade and investment. Second, as national economies open, more people at the grass roots of society try to do new things which in turn leads to new businesses, new inventions and new goods and services. Third, as international treaties (in addition to the TRIPS Agreement) strive to better serve trade, they often now include commitments to improve intellectual property protection as well.

These trends, in turn, are producing a rapidly expanding database of scientific and technical information, increased activity and new

[*512] patterns of activity. It is quite natural therefore that more applications for industrial propertyrights of all kinds are being presented in most countries than before. In the field of patents, the number of patent applications being filed throughout the world had been increasing in some developing countries before the TRIPS Agreement was created. n39 The upward trend will no doubt continue and may increase at an even higher rate.

B. TRIPS Requirements

To assess the financial and other implications of the TRIPS Agreement for public administration in developing countries, it is important to note both what is, and what is not, required by the Agreement.

Under Article 1 of the TRIPS Agreement, Member States commit themselves to provide protection for intellectual property. The relevant intellectual property consists of the categories treated in Sections 1 through 7 of Part II. The list is fairly comprehensive and will impose new administrative burdens for many developing countries. While most developing countries already provide some type of public administration for patents and trademarks, and to a lesser degree for copyright, many do not yet provide public administration for semi-conductor layout design ("chips"), new plant varieties, geographical indications, "neighboring rights" in relation to copyright, or industrial designs. For some countries, the same is also true for service marks. Each of these areas is discussed below.

Even for countries with existing public administration for trademarks and patents, the extension of subject matter coverage in both fields will almost surely introduce new burdens for public administration. These fields are discussed in detail below.

On the other hand, for some countries the commitment to observe TRIPS Agreement requirements will reduce copyright administration since formalities may no longer be required for the creation of copyright.

Article 2 of the TRIPS Agreement states that Members shall comply with Articles 1 through 12 and Article 19 of the Paris Convention (1967) with respect to Parts II, III and IV of the TRIPS Agreement. Part IV explicitly addresses public administration. For countries which are already members of the Paris Convention, no new administrative responsibilities will be added. For other WTO member

[*513] countries, the provisions of the Paris Convention which may imply administrative requirements or limitations include the following:

Article 4: a right of priority for filing applications must be granted if filed within twelve months for patents and utility models and six months for trademarks and industrial designs. Procedural rules for implementing this right are specified.

Article 5A: importation by the patentee into the country where the patent has been granted of articles manufactured in any WTO member country shall not entail forfeiture of the patent.

Article 5D: no indications or mention of the patent, of the utility model, of the registration of the trademark, or of the deposit of the industrial design, shall be required upon the goods as a condition of recognition of the right to protection.

Article 5bis: a grace period of six months is required for the payment of maintenance fees, although a surcharge for late payment may be imposed.[cm

Article 6bis: well-known trademarks are to be protected against registration and use by others.

Article 6quater: trademarks included as part of a transferred business or goodwill to which the mark belongs are deemed validly assigned.[cm

Article 7bis: collective marks are to be protected under defined circumstances.

Article 9: goods unlawfully bearing a trademark or trade name are to be seized on importation or within the country, although wide exceptions are permitted.

Virtually all of these provisions are likely to alter or intensify existing procedures rather than require the institution of new ones. Their financial impact on public administration will be marginal.

National treatment is required by Article 3. This means that the protection of intellectual property accorded to nationals of other Members shall be no less favorable than the treatment accorded to nationals of a Member. A footnote states that "protection" means not only the matters addressed directly in the TRIPS Agreement, but also matters affecting the availability, acquisition, scope, maintenance and enforcement of intellectual property rights.

The national treatment requirement of Article 3 is subject to exceptions previously provided by several international conventions. n40

[*514] Article 3(2) provides, however, that Members may avail themselves of these exceptions in relation to administrative procedures only if they are "necessary to secure compliance with laws and regulations which are not inconsistent" with the TRIPS Agreement provisions and "where such practices are not applied in a manner which would constitute a disguised restriction on trade."

Throughout Part II of the TRIPS Agreement, the substantive requirement may imply adjustments in practices and procedures and, thus some incremental costs. For example, countries with trademark terms of less than seven years may need to adjust their forms and procedures to accommodate that minimum period of protection, although the longer interval should reduce registry operating costs over the long term.

Part III of the TRIPS Agreement deals with the enforcement of intellectual property rights and is addressed below.

Part IV of the Agreement deals with public administration as it addresses the acquisition and maintenance of intellectual property rights. Article 62 is its sole article. It provides that Member States may require compliance with procedures and formalities, but they must be reasonable. For intellectual property rights which are subject to grant or registration for their acquisition, the Member State is to assure that the required procedures are conducted within reasonable periods of time so as to avoid unwarranted curtailment of the periods of protection.

Article 62 also stipulates that service marks are to be accorded the treatment provided for trademarks and patents under Article 4 of the Paris Convention. For countries which have not previously offered protection for service marks, this will entail an expansion of public administration.

Article 62 also incorporates the general principles set out in Article 41(2) and (3). Paragraph (2) states that procedures concerning the enforcement of intellectual property rights shall be fair and equitable, not unnecessarily complicated or costly or entail unreasonable time-limits or unwarranted delays. Paragraph (3) requires reasoned and written decisions on the merits of a case which are made available to the parties without undue delay. Moreover, only evidence as to which parties were "offered the opportunity to be heard" may be relied on as the basis for a decision on the merits. These general principles are to be applied not

[*515] only to procedures concerning acquisition and maintenance of rights, but also to administrative revocations and to disputes between parties, such as oppositions, revocations and cancellations.

Thus, Article 62 provides that procedures are to be timely and reasonable, fair and equitable. While many of these requirements are "soft" in that they do not submit to precise measurement, their meaning will probably eventually take on more specific parameters as experience is gained under the World Trade Organization dispute settlement procedures. More immediately, the general principles of Article 41 will signify greater burdens of notification and examination for some countries regarding evidence-based decision making. For some countries, avoiding unwarranted delays, as required by TRIPS, will entail administrative enhancements which imply application of greater resources, personnel training and other adjustments. n41

1. Copyright and Related Rights

Public administration of copyright and related rights is unusually minimal. Since copyright subsists when a work is created or expressed, without the need of formalities, the responsibilities of public officials are limited.

Some countries provide a public place for the deposit of works in which copyright subsists. Such deposits can serve as evidence of original authorship, but authors are free to determine for themselves whether it is worthwhile to make the deposit, and there are alternative techniques for securing evidence. n42 These depository locations can serve as centers for public information. The Library of Congress in Washington, D.C., is a famous, albeit costly, example. The TRIPS Agreement does not oblige countries to create such centers.

As an adjunct to copyright and related rights, particularly to performance rights, various kinds of agencies and performers societies are created in many countries to aid in the collection of royalties. In some instances these organizations have been established as public agencies, but, again, this is not required by the TRIPS Agreement.

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2. Trademarks

Trademark acquisition and maintenance imposes a considerable burden on public administration. For countries which already facilitate the creation and use of trademarks that is, for most countries N the TRIPS Agreement will only mandate adjustments and extensions of existing administrative practices rather than the introduction of new administrative functions.

The costs of such adjustments and extensions may be more than nominal, however. For example, since logos, designs and even combinations of colors are to be registrable as trademarks under the TRIPS Agreement, trademark registries may find it expedient to utilize computers with graphical and color- search capabilities. The requirement that service marks are to be protected may further extend the work of some trademark registries, with an increase in applications in the range of ten percent to twenty percent. Fee income should support these expenses.

Prompt publication of trademarks after registration (Article 15.5) may impose a requirement at variance with practice in some countries. The costs of prompt publication may, in some instances, rise slightly in comparison with delayed publication. Some registries hold new registrations for publication until there is a substantial number of them. Sometimes a country's official gazette is overwhelmed with the responsibility of publishing extensive new legislation or other urgent materials which crowds out the trademark registrations. The TRIPS Agreement's requirement of prompt publication does not contemplate crowding or volume as valid considerations. Fees collected for the purpose of publication should be adjusted to offset any increased expense incurred in assuring prompt publication.

3. Geographical Indications

Articles 22 to 24 of the TRIPS agreement require Members to provide the legal means to prevent the use of indications of geographical origin which are not true. This requirement, by itself, creates no need for public administration. However, it will impose on trademark registries the new burden of determining the true origin of trademarked goods. The public cost of doing so can probably be restricted for the most part by placing on the private parties involved the burden of producing credible evidence.

A footnote to Article 23(1) could lead to a new kind of public administration function. In discussing additional protection for

[*517] geographical indications for wines and spirits, the footnote says that countries may, as an alternativeto judicial enforcement, provide for enforcement by administrative action. Resort to public administration in this case is optional but might be useful to lessen the burden on judicial systems. Since the provision to which the footnote relates does not involve trademarks, it would not be a responsibility of the trademark registry. Presumably this administrative function would be placed upon whatever public agency deals with the regulation of public advertising. The cost of this function is speculative and would largely depend on what similar regulatory function might already exist. There would probably be no directly offsetting public income.

4. Industrial Designs

The industrial design category of intellectual property has been adopted in several ways by different countries. In some countries, it is dealt with as a branch of copyright, in others, as an offshoot of patent protection. In still others, it exists as a separate, free-standing category. Some countries grant no such protection in this area.

Public administration of industrial designs is not expressly required by the TRIPS Agreement. This leaves countries free to determine how to create and administer protection for industrial designs.

Industrial designs are included within the coverage of the Paris Convention. n43 The Hague Agreement provides for international deposit of industrial designs. n44 About 25 countries are members of this agreement.

The only specific requirement in the TRIPS Agreement which bears on public administration of industrial designs is that the term of protection shall be at least ten years. n45 The Paris Convention establishes a right of priority for applications filed within six months of the original application. n46

For countries which have not in the past offered protection for industrial designs, there appears to be considerable leeway as to how public administration might be conducted. If left to protection under copyright there will be a minimal administrative burden. If a registry is created,

[*518] then both start-up and operational expenses will be incurred, with fees paid by applicants offsettingthese costs.

Through membership in the Hague Agreement, it would be possible for a country to keep administrative costs to a minimum by permitting that designs be submitted for international deposit with the International Bureau of WIPO in Geneva. On payment of fees, the applicant may then obtain protection in other countries which are members of the Hague Agreement. WIPO publishes pictures of the design to provide international notification.

5. Patents

Of the various categories of intellectual property protection, patent acquisition and maintenance imposes the heaviest burden on public administration. For countries which already facilitate the creation and use of patents that is, for most countries the TRIPS Agreement will primarily mandate adjustments and extensions of existing administrative practices rather than the introduction of new administrative functions.

The costs of such adjustments and extensions, however, may be more than nominal. Since under Article 27 patents are to be available in all fields of technology with only a few exceptions, those countries which have had broader exclusions from patentability in the past will now receive applications in fields of technology not previously examined. In due course, this could increase substantially the burden of public administration for patents. The dimensions of this increase, and possible offsetting measures are discussed below.

Two other provisions in Article 29 may impinge on patent office practice. One states that Members must require applications to disclose the invention in a manner sufficiently clear and complete for the invention to be carried out by a person skilled in the art. This is a widely followed requirement, but for countries which have not used it in the past, some adjustment in patent office practice could be implied.

The other provision of Article 29 states that Member States may require that the application indicate the "best mode" for carrying out the invention, at least as known at the time of the application. Drafting this part of an application is costly in terms of lawyers fees. It modestly increases the burden of technical examination for substance. It is chiefly a requirement of the United States, echoed to a lesser extent by European practice. The best mode requirement is chiefly a trap for unwary applicants.

If a statement of "best mode" were to be required by developing countries, the burden imposed would rest primarily on applicants, but each

[*519] patent office would probably need to atleast expand its examination of the formalities of applications. Thus, in order to minimize administrative burden, it is probably desirable that developing countries forego requiring an indication of best mode.

Article 29 states that Members may require applicants to provide information concerning corresponding applications and grants in other countries. Such requirements are sometimes viewed as useful to patent offices in developing countries. This is one of the inefficient and indirect ways such an office relies on the major examining offices for conduct of technical examinations. n47 The burden on applicants can be considerable if the requirement is used aggressively by a developing country patent office. The discussion below under cost reductions suggests a more direct, lower cost approach with less administrative burden.

The granting of compulsory licenses imposes an occasional burden on public administration. Whether Article 31 adds to that burden depends on the previously existing rules for compulsory licensing in each country. Subparagraph (b), for example, requires that, if a country grants compulsory licenses, their award must involve judgments regarding "reasonable commercial terms" and "a reasonable time period."

Subparagraph (h) states that the patent holder is to be paid "an adequate remuneration in the circumstances of each case, taking into account the economic value" of the grant of the compelled license. For countries which have not had statutory authority for such remuneration in the past, some public administrator, probably in the patent office, will now be required to make decisions involving complex judgments regarding value which often puzzle even the most sophisticated experts in the field of intellectual property valuations.

Again, subparagraph (k) may call on patent office officials to determine whether conditions which led to the grant of a compelled license are likely to recur, and subparagraph (l) involves determining whether an invention involves "an important technical advance of considerable economic significance."

If not already part of the conditions for award of compulsory licenses, each Member State patent office would need to prepare for making the foregoing judgments in response to the TRIPS Agreement. The cost of doing so depends on the existing capabilities of registry personnel and the data and information available to them, but it could be considerable.

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The skills and judgments required to exercise discretion in these various situations are quite different from the skills and judgments required to administer the granting of patents. To the extent that such burdens are placed on the patent office, more highly qualified officials would be required. Such burdens can be reduced by imposing offsetting fees on those who would apply for the benefits of such discretion and by reducing or eliminating these kinds of discretion. The patent office should not be required to take the initiative in exercising discretion.

Since the award of compulsory licenses is often a contentious matter, another cost a country must consider is the cost of administrative appeals and of judicial system use when further appeals are lodged. There is also the cost of discouraged investors.

6. Plant Varieties

Article 27, subparagraph 3(b), states that WTO Members may exclude from patentability plants and animals other than micro-organisms, and essentially biological processes for the production of plants and animals other than non-biological and microbiological processes. However, it goes on to stipulate that they must provide for the protection of plant varieties "either by patents or by an effective sui generis system or by any combination thereof." The nature of an effective sui generis system is not further defined, but many countries will probably adopt protection compatible with the UPOV system. n48

For many developing countries, the agricultural sector forms an important part of the economy. The application of even a small increment of new science to that sector could produce significantly favorable results. Generally speaking, patent protection tends to support agricultural research which uses the new tools of genetic engineering, while UPOV-style protection responds well to the more traditional "field" research based on selecting the best and strongest plant and animals for breeding, cross-breeding and hybridization. n49 To best advance agricultural science, some countries will provide patent protection for transgenic plants and animals as well as UPOV-style protection for new plant varieties, keeping in mind that generally patents provide stronger protection.

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Whatever approach is selected for the protection of plants above the level of the micro-organism, there will be additional public administration functions. If patenting of transgenic plants is chosen, the resulting extension of patent administration could involve added expenditures, although the discussion below suggests low cost approaches to this extension.

If a sui generis system is adopted, some minimum resources will be needed to establish the registry and depository which is implicit in this form of protection. n50 Some countries will have an existing agricultural facility suitable to the purpose. The administrative apparatus is often most conveniently housed within a ministry of agriculture, although in some cases samples of a new variety could be deposited with the agricultural division of a public university or other institution. While user fees can eventually offset the costs of a plant protection system, there may be modest initial start-up expenses which may be an appropriate object for technical assistance.

In some areas of the world, a regional approach to plant protection may be feasible. The Andean countries provide an example. Cooperation among UPOV member states has developed, with countries specializing in examination of certain types of varieties. Switzerland makes maximum use of the UPOV system in this fashion with limited personnel.

7. Integrated Circuit Designs

The TRIPS Agreement states that Members agree to provide protection to the layout-designs (topographies) of integrated circuits. Protection for this category of intellectual property is to be based on enumerated articles of the Washington Treaty n51 as supplemented by Articles 36 to 38 of the TRIPS Agreement.

Article 4 of the Washington Treaty states that each country is free to satisfy the obligation to provide protection for integrated circuit designs through a special law or as part of its law on copyright, patents, utility models, industrial designs, unfair competition or any other law or combination of those laws.

Article 38 makes clear that countries may, but need not, require registration as a condition for protection. This implies that a registry is

[*522] not mandatory. This would be helpful in reducing administrative costs. Article 7(2) of the WashingtonTreaty also speaks of registration, but in a way which implies a registry is not mandatory. n52

In view of the costs involved in mounting public administration for this form of protection, countries which create a registry could avoid substantial administrative costs by relying on larger countries for determinations of originality, if nothing else. Nothing in the TRIPS Agreement or in the Washington Treaty prohibits this. Some form of international cooperation similar to the Patent Cooperation Treaty might usefully be developed to eventually facilitate this form of protection for such countries.

Article 37 states that Members may authorize non-voluntary licensing of integrated circuit designs. Although this provision is considerably restricted by Article 31(c), some public administrator will be required to make decisions.

The level of administrative costs associated with integrated circuit design protection appears to be within the control of each country, particularly if protection can be satisfactorily provided without resort to creation of a registry.

C. Cost Estimates

For many developing countries, the implications of the TRIPS Agreement for public administration will be limited to extensions of existing functions. Thus, cost increases will be incremental and modest. Yet for other countries functions which have not previously been provided will need to be instituted, with corresponding one-time start-up costs and then continuing operating costs. It is difficult to generalize regarding administrative cost implications for developing countries. Whatever the cost implications, user fees should offset at least new operating costs and over time may pay for start-up costs. Bridge financing from external sources for start-up costs might be warranted.

Intellectual property offices in most countries earn various fees which are meant to correspond to the costs of public administration. However, these fees are typically paid or transferred to the national treasury with only a portion returning through budget allotments. In many countries, accounting records are not sufficiently refined to determine whether the intellectual property offices function at a deficit

[*523] or surplus and whether budget allotments fully correspond to the costs of public administration. Inmany cases they do not.

In fact, many offices suffer a lack of adequate resources to perform their functions well. There are instances where an entire ministry survives on the revenue produced by a patent and trademark office, yet the office itself is under-funded. In a few countries, the patent and trademark office charges no fees. In some countries, the intellectual property functions are conducted in multi-purpose offices housing other functions, such as the companies registry, land records and so forth. In these situations, fees from one function may subsidize others, often by accident for lack of adequate allocation accounting.

It is not uncommon for an intellectual property office which depends on budget allocations to be denied adequate resources year after year so that over time it slowly loses its more capable people, fails to maintain or acquire more modern equipment, and goes into decline. Eventually, the backlog of unprocessed applications reaches crisis levels. Then it is typical to conduct a "crash program" at considerable expense to eliminate the backlog. This expense can more than equal the resources saved by restricting budget allocations during the period of decline. After the crash program is finished, it is also typical for the office to slip once more into decline for lack of sustained adequate resources.

A remedy for the problem of recurrent decline which has served some countries well is the establishment of the intellectual property office as a semi-autonomous institute with authority to retain and apply the fees received to capital and operating expenses and with authority to hire, train and dismiss personnel. The more successful such institutes have had unpaid, non-political boards of directors. In effect, such institutes operate as virtually privatized companies, living within their resources and sustaining effective administration over time.

Having offered these general comments, specific comments are in order regarding administration for trademarks and patents. Comparable comments for the other forms of protection have been offered above.

1. Trademarks

As noted already, a main thrust of the TRIPS Agreement for trademarks is to extend protection to new types of signals, often involving graphical designs and logos. TRIPS does not mandate the use of computers, of course, but good software is the core of effective public administration for trademarks. The state of the art has advanced to include graphical records and search capability and even phonetic comparisons. Adjusting to the TRIPS requirements may offer the

[*524] occasion for countries to install or upgrade computerized administration and this may be an excellent opportunity for technical assistance from various sources.

Developing countries may be well advised to take full advantage of the Trademark Law Treaty. n53 By standardizing procedures, this treaty can reduce paperwork burdens including errors by applicants. As software is written to respond to this treaty's procedures, it should reduce software costs and permit more cost-effective multi-country training programs.

The Madrid Agreement Concerning the International Registration of Trademarks, n54 in addition to serving applicants, can reduce administrative burdens for trademark offices. For example, publication is not required. The treaty can provide a source of revenue as well. Developments regarding the Madrid Protocol n55 may also help to reduce administrative burdens.

2. Patents

As noted already, a main consequence of the TRIPS requirements for patents will be the extension of protection in some countries to previously excluded fields of inventions, such as pharmaceuticals, fine chemicals and software. For public administration, this implies increased burdens of examination and processing which could involve significant cost. This is probably the single largest increase in public administration costs any developing country is likely to face.

A one-time increase of applications will likely occur after January 1, 2000, when previously excluded subject matter fields must be made patentable. The size of the increase will depend in part on the extent of prior exclusions and the size and wealth of the particular country. For some countries, patentability for some presently excluded subject matter fields, such as pharmaceuticals which tend to yield a large number of applications, may be delayed for a further five years.

Article 70(8) of the TRIPS Agreement's transition provisions requires that applications for pharmaceutical and agricultural chemical product patents be accepted on a standby basis (the "black box") to await

[*525] examination after transition periods expire. For many countries, this will mean a substantial backlogof applications will build up over five to ten years, then abruptly require timely examination.

Not all countries will receive a flood of applications, however, because even large companies face budget constraints when applying for patents around the world. n56 With some large companies, strategic investment plans for various countries and regions compete for patent application funds. Eventually there may be competition among countries to attract patent applications.

We could hope that the experience of countries which have improved their patent laws might help us predict the degree to which patent applications will increase as countries conform to TRIPS Agreement requirements. Table 3 examines the trend in applications for five countries from 1983 to 1993:

[*526]

[SEE TABLE IN ORIGINAL]

Three of these countries, Chile, Mexico and South Korea, made significant law reforms during the period, while the other two, Brazil and Egypt, did not. Chile changed its patent law in 1991, with a noticeable corresponding increase the following two years. When Mexico eliminated a number exclusions from patentability in 1991, the volume of applications increased the following year by about forty-six percent increase the following year and steady increases thereafter.

[*527]

On the other hand, Brazil made no changes over the period, yet experienced significant increases, perhaps in anticipation of the law reform finally enacted in 1996. Egypt made no improvements and yet showed a twenty-two percent increase in 1990.

From this limited sample, it can be predicted that for at least some countries a temporary surge in applications in the range of fifteen to twenty percent is likely to result from broadened patent coverage. n57 At the same time, it appears that other factors will also produce surges.

As can be seen, the substantial increase in Mexico for 1992 was due to foreign applicants. Applications from residents remained steady for 1991-93. Mexico's patent law was upgraded from TRIPS- parity to a robust level through fine-tuning late in 1994. In 1994, total applications rose to 9,944 although applications from residents declined to 498. In 1995, Mexico's entry into the PCT took full effect with a consequent temporary decline in filings to 5,234, and with applications from residents declining to 432. These declines will rebound and probably be exceeded within 30 months from Mexico's entry into the PTC as an increasing number of applications are received through the PCT process.

D. Cost Reductions

What might be done to reduce the increased costs of patent administration? As noted above, except for a few broad concepts, the TRIPS Agreement does not specify the mechanics of how countries are to grant patents nor does the Paris Convention. This sets the stage for consideration of a remedy for one of the major absurdities which afflicts patent administration. That is the tendency for many countries to attempt to perform a technical examination for substance. What is involved is a determination as to whether an invention is new when measured against the world's body of scientific and technical literature at the time the application is filed. Each country repeats the same technical determination.

Today, only a handful of patent offices are fully prepared to examine all patent applications for substance. The United States Patent Office employs about 2,200 examiners, most with the highest academic credentials, and the office provides them with an extensive library and search capabilities and opportunities for ongoing legal and technical training, all at an annual cost of some $ 300 million. The European Patent Office functions at approximately the same level.

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The patent laws of some developing countries stipulate that the patent office is to perform a technical examination of applications received, while other are silent on this point. In reality, most developing countries do not perform technical examinations of patent applications. Even countries the size of Brazil, which has 100 examiners and budgets close to $ 60 million a year for patent examination, are hard pressed to conduct serious and timely examinations of applications in all fields. In practice, developing countries adopt various informal strategies in attempting to comply with statutory requirements to perform examinations.

Pakistan, a country with over 100 million people, has but four patent examiners. They are able and well-trained, but their work is severely constrained by a scientific library for which acquisition funds dried up two decades ago. It is difficult for them to know the current state of the art in any field. They have tried bravely to compensate by requiring patent applicants to submit extensive documentation regarding the state of the art surrounding their application.

A number of patent offices hire local university science professors to conduct technical examinations. In Ecuador this is done, but without benefit of a contract which would require the professor to hold the application in confidence. Confidentiality is quite important prior to the official publication of an application. The quality of the examination will depend on the knowledge, interest and skill of the professor, who may be happy to earn extra income, but who may not be well versed in technical examination of patent applications. The quality will also depend on the extent and currency of the university's library. A delay in receiving new publications could impair the quality of a technical examination.

Regional patent offices are now being proposed as a means of improving examination capability. For most regions, even pooling resources will not provide an adequate capacity for examination. Instead, regions might wisely take advantage of relatively low cost access to the international examination authorities through satellite communications, computer networks, such as the Internet, and CD-ROM capability. Indeed, computer technology today will permit creation of virtual regional offices, located in cyberspace rather than in any one country, which can function as centralized administrative centers for all countries of a region.

A well-run regional center might modestly increase revenue for participating countries, particularly if a single application could achieve protection in each country. As more applications are filed in multiple countries, and yet as applicants strain to pay the associated fees, patent offices will increasingly compete for applications. Thus, the volume of

[*529] filings in a regional office would presumably increase, but that increase would tend to be restrained ifthe associated fees rose much above the equivalent of the fees for a single large country.

In many developing countries today, the patent office, without any statutory authority, will unofficially ask the applicant to provide proof that a patent has been granted by some other patent office, usually in the United States or Europe or another major developed country. This is at least an honest attempt at providing a reliable determination. The patent laws of Slovenia, Singapore and Australia take the approach of explicitly asking for such proof. Slovenia accepts an application, examining only for formalities, and postpones the search for up to nine years, then accepts the technical search of the European patent office.

Of the nearly ninety countries which are members of the Patent Cooperation Treaty, n58 over sixty are developing countries or transition countries. Under this international convention, technical examinations are performed for member countries in any of nine designated international searching and examining authorities. n59 Countries designated in applications receive the international application accompanied by a search report and, in most cases, a preliminary examination performed in one of the nine authorities. The nine are the European Patent Office and the patent offices of the United States, Japan, Australia, Austria, China, the Russian Federation, Spain (searching only) and Sweden.

Under the PCT, inventors who are residents or nationals of a member state may file an "international" patent application. n60 The application may be filed in the "home" country or with the International Bureau of WIPO and must comply with certain formal requirements. n61 The application has effect in all member states designated by the applicant as if it had been originally filed in each. n62 An international search is then performed by one of the designated international searching authorities. n63 The search report is sent to the applicant and, if the application is not withdrawn, is published by the International Bureau and communicated to each designated patent office. n64 Then the applicant has twenty months from the priority date of the application to commence

[*530] proceedings before each designated national (or regional) office. n65 By further requesting an international preliminary examination, this period can be extended by 10 months. n66 About ninety percent of all international applications are kept alive to reach the examination stage, and of these, virtually all request the preliminary examination, thereby attaining a total of thirty months before the heavy expenses of national proceedings must be commenced.

For patent offices, a major advantage in these PCT arrangements is that they can be relieved not only of the search and examination burden which is delegated to one of the designated international authorities, but also of the need to examine the formalities of the application. This is reducing local administrative costs considerably. n67

For applicants, a major advantage in these PCT arrangements resides in the ability to delay the moment when the substantial costs of proceeding in each national office must be incurred. These costs include not only application fees but also translation costs and local agent fees. n68

It is interesting to note the sharp recent increase in the number of international applications which designate 11 or more countries. Under the PCT fee structure, once 11 countries are designated and the fee paid, an unlimited number of additional countries may be designated for no added fee. n69 Consideration could usefully be given to postponement of this fee, as discussed below.

Historically, some developing countries granted patents of "confirmation" or "validation" based on grant of a patent by another country, often the colonial mother country. Some continue this practice and, thus, attempt no technical examination.

In summary, while some developing countries bravely attempt to conduct technical examinations, many others rely on the major examining authorities either informally or explicitly or through the PCT.

[*531]

E. A Reference System

It is suggested that in order to reduce public administration costs as much as possible, all but the largest countries will do well to make use of a "reference system" somewhat comparable to the older confirmation or validation approach to patent examination. A reference system would take the Patent Cooperation Treaty one step further.

Under a reference system, a developing country (or even an entire region) would grant a patent that corresponds to any patent granted by any of the major examining patent offices. This would be subject to local exclusions from patentability. Though virtually automatic, countries might provide specific grounds for a local challenge, preferably after grant of the patent, perhaps in the courts. By way of example, invalidity based on prior art or fraud in an original or local application could be challenged locally.

Under a reference system, the developing country would initially require, in place of an application, only a notice of intention to request a "patent of reference." This would establish a national filing date. The notice would contain only enough information to identify the application(s) abroad on which the eventual patent application would be based. The notice could contain a brief description of the invention, with a translation if necessary. The form which this notice takes could be agreed, perhaps by an extension of the PCT. The notice could provide developing countries (and agents) an opportunity to receive a small fee at the outset and more fees as applications mature. An increase in the number of eventual applications could be expected.

The patent granted locally would live and die with the foreign patent of reference. Thus, if the original application were modified during its prosecution, only the result would be taken in reference for the locally granted patent. If the patent of reference were later declared invalid in the country of origin, the local patent would become subject to invalidation. The local patent could terminate with the term of the patent in the country of origin, subject to any other considerations, such as patent term extension.

A local inventor would also file a notice of intention to use the reference system and would then be assisted by the local patent office in making an application to one of the major examining patent offices. Thus, for a relatively small amount, the inventor could automatically obtain patents in as many other countries as adopt a reference system. This would be a tremendous boost for small inventors in developing countries, particularly if translation costs can be minimized.

Several possible objections to a reference system deserve brief discussion. First, it could be viewed as "neo-colonialism." However,

[*532] developing countries would be free to determine which international examination authorities would serveas reference, eliminating dominance by a former colonial power. Perhaps an international treaty, or an annex to the PCT, could provide reference system arrangements to further minimize this objection.

Another objection might be that foreigners will make the decisions concerning the applications. While that is true, the decision is essentially technical in nature and many countries will rely on the same decision. As a further offset, specific challenges to decisions made by major examining authorities could be permitted, as, for example, in the case of invalidity.

Still another objection might be that search and examination results in the major examining authorities are often "different." Under TRIPS this will be less so than in the past. While rules might differ at the margins, different outcomes are likely to be infrequent. The comparative experience of the United States Patent Office, the European Patent Office and the British Patent Office points strongly in this direction. n70

Another objection to a reference system might be that local patent agents would be denied work. However, few agents in developing countries conduct patent practice as it is conducted at the international examination authorities. A greater volume of applications would offset slightly reduced amounts of work. Moreover, most agents rely far more on their trademark practice than on patent applications.

Finally, there may be the objection that it is important for a patent office to provide citizens with a source of technical data through publication of patent applications. This function is not discarded, only satisfied in a different way, primarily through the technology of digital information transmission which has changed remarkably in the last eighteen months now that the Internet provides low-cost world-wide access to searchable databases.

Traditionally, patent offices have been a repository for technical information in the form of published patent applications. Today, however, it is possible to go on-line from most countries to access

[*533] international databases which effectively substitute for the traditional patent office file room. Science researchers in most countries work in English and already search for the latest technology in this fashion. Utilization of patent office file rooms in developing countries will not increase. Instead, it would probably make better sense for patent offices to abandon attempts at competing with these electronic databases. They could instead become providers of access to electronic repositories of the latest technological information. This might mean subsidizing internet access for ordinary citizens, offering instruction in how to use sophisticated search and retrieval software for electronic databases, and otherwise maximizing the use of the latest means to access technical information.

It is important to suggest that a patent granted by a developing country using a reference system will have a greater value than a patent which results from examination by a less than fully qualified office. This means patents are more likely to be sought in countries which use a reference system. This can mean greater revenue from fees and a stronger invitation to investment.

The patent office of the future in developing countries may look more like a computerized information retrieval center than the patent office of the last hundred years. Satellite connections and on-line services will facilitate information flows. Fees will be collected and the volume of applications and grants will be higher, but with lower administrative costs. The public will have better access, including search capability, to more extensive databases, without visiting the patent office.

F. Fee Postponement

It may be worthwhile for developing countries (and developed countries as well) to consider a second "absurdity" of patent administration. It is that the considerable costs of acquiring a patent are imposed on an inventor precisely during the difficult period when funds are urgently needed for technical development of the invention prior to commercialization. In other words, immediately after an invention is made, two divergent trails must be pursued. One is a paper trail, driven by the race to the registry and the one year priority period. This trail bears no relation to the other, the technical trail which seeks the commercialization of a successful product or process.

In the typical case most of the costs of the paper trail must be borne before there is any income from the invention. Indeed, they must be borne before there is any assurance there will ever be any income.

[*534] Many inventions have probably perished because inventors could not sustain both the technical development costs and the costs of obtaining adequate protection. n71 The problem is not that both trails coexist. It resides in the unfortunate timing of the paper trail costs.

Thus, as a second suggestion, it might well be preferable, both from an inventor's point of view and from the public perspective of bringing more new technology into the economy, if the front-end costs of acquiring a patent could be materially postponed in deference to the resources needed to develop the technical trail. n72 The suggestion pertains to both small and large investors. To a limited degree, as noted above, postponement of fees and related expenses can be helpfully achieved through use of the Patent Cooperation Treaty. That postponement is relatively brief, however, when compared to the timing of fees without benefit of PCT. Consideration might usefully be given to extending further the periods already established under the PCT.

Thorny issues arise, of course, regarding many issues, including the desirable length of the postponement and the timing of searches, but any delay which can serve to bring fee payments more in line with an expectation of revenue produced by the invention would stimulate investment in technological growth in developing countries.

One of the largest expenses for applicants is the need to provide translations of their applications. A partial solution might be to require translations for only limited portions of the application, at least until some identifiable later event, such as litigation or first commercial sale. n73

This suggestion to "backload" fees could imply a period of relatively low income for patent offices in the years immediately after the concept is initiated. In many developing countries, the ratio of

[*535] patent to trademark applications is steeply in favor of trademarks. Thus, a period of postponed patentfee income could be at least partially covered in some countries by revenues from trademarks. This appears to be the case in Brazil, for example. Moreover, the suggestion of a reference system made above greatly reduces the cost of administration. Still, interim financing from external sources might be needed to initiate the practice of fee postponement. This would be a highly appropriate situation for interim technical assistance.

In many countries inventors call on risk capital as the means of obtaining the financial resources needed to meet start-up costs. Applying this type of financing to satisfy the cost of paper events perhaps points to the question of whether patent administration is a servant of invention or the reverse.

Fee postponement could well increase the number of patent applications in any country and might be a viable strategy for developing countries seeking to stimulate local investment. It would particularly serve to encourage local inventors of all kinds. If coupled with a patent reference system, as discussed above, the two concepts could enable local inventors in developing countries to achieve patent protection in a number of countries at a relatively low initial cost. This would go a great distance to supporting the promise of the TRIPS Agreement for developing countries.

The TRIPS Agreement will eventually produce more countries with viable intellectual property systems where it will be worthwhile to seek patents. Yet the cost to file a patent application in all the major countries of the world is already approaching $ 200,000. n74 Much of the cost arises from repetitive paper transactions. As countries compete for investment, they may want to encourage growth of their stock of granted patents. This will imply careful attention to the costs of patent administration and to the resulting fee levels and the timing of fee payments.

Finally, the interface between administrative and judicial decision-making deserves careful scrutiny in many countries. Opportunities abound for reducing the costs and delays at this interface.

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V. Judicial System Responsibilities

A. What TRIPS Requires

An intellectual property right without a legal remedy amounts to little more than an expensive illusion. The TRIPS Agreement attempts to eliminate such illusions. Articles 41 to 61 particularize at length basic measures designed to assure that legal remedies will be available to sustain and defend intellectual property rights.

These articles provide that right holders are to have available the means to effective actions against any act of infringement. There are to be expeditious remedies to prevent and deter infringements. Procedures are to be fair and equitable, not unnecessarily complicated or entail unreasonable time-limits or unwarranted delays. Decisions on the merits are to be preferably in writing and reasoned, made available to the parties without undue delay, and based only on evidence the parties had an opportunity to rebut. Final administrative decisions are to be subject to judicial review.

Civil and administrative procedures and remedies are delineated in one article. n75 They include the assurance that confidential information will be protected during and after proceedings. In another article, authority to discover evidence solely in the hands of another party is to be provided, and refusal to provide evidence may not stand in the way of a decision. n76 The conditions under which precautionary measures, such as injunctions, are to be made available are stipulated in a third article. n77 Other articles recite the approach to damages, n78 to other remedies, n79 to compelling information regarding other infringers n80 and indemnification of defendants. n81

Article 50 deals with provisional measures in detail. This includes measures to be taken even in the absence of the infringing party. Articles 51 to 60 require member countries to provide authority for a party to lodge a request with customs officials to block the importation of

[*537] infringing goods. These border measures are balanced with precautions against false charging anddelays.

Finally, Article 61 specifies various criminal procedures which countries are to make available to prevent infringements.

These articles set out a blueprint for effective defense of intellectual property rights.

B. The Real World

For many countries, Articles 41 to 61 imply considerable adjustment to judicial systems, civil and criminal procedures and border enforcement measures. The costs of these adjustments, in terms of resources, legislative time and official attention could be considerable. For many countries these adjustments will be a strain. Indeed, many judicial systems are simply not up to the indicated tasks in that they do not function well for any area of the law, much less for intellectual property.

Article 41(5) seems to have recognized this reality. It states that the TRIPS Agreement:

does not create any obligation to put in place a judicial system for the enforcement of intellectual property rights distinct from that for the enforcement of law in general, nor does it affect the capacity of Members to enforce their law in general. [Nor does it create] any obligation with respect to the distribution of resources as between enforcement of intellectual property rights and the enforcement of law in general.

This language is likely to become pivotal as the TRIPS Agreement is implemented over the next decade. Yet many of the adjustments can be made without incurring undue costs, and others will involve one-time conversion or start-up costs as to which technical assistance may be available.

If a judicial system is characterized by deficiencies such as widespread corruption, lack of judicial independence, and poorly qualified appointments to the bench, then the language of Articles 41 to 61 will be of limited avail, even had Article 41(5) not been included in the TRIPS Agreement. The rulers of certain countries take offense if these characteristics are alleged. Thus the poor functioning of judicial systems in many countries is a delicate topic.

This topic is delicate in areas beyond intellectual property. Various multilateral lending institutions, such as the World Bank and the Inter-American Development Bank, have initiated programs designed to aid judicial reform in general in selected countries, and large segments of the populations in many countries are sensible of the need for reform.

[*538] Reform of judicial systems may be stoutly resisted by various elites, however, as a matter of self-interest rather than any ideology. n82 Reform efforts based on moral or ethical considerations, however well founded, do not appear to have been particularly successful.

A new approach to judicial reform is now emerging which may serve to buttress reform efforts. It is founded on economic considerations. Stated briefly, the thought behind this new research suggests that countries with weak judicial systems suffer significant constraints on national economic growth. n83 Economic study has recently provided strong indications that "institutions matter" to the economic performance of a country. n84 Among institutions that matter, judicial systems seem prominent. Research now underway aims to quantify the role of judicial systems in relation to general economic performance. n85 It is hoped that this "pocket book" approach to judicial reform will soon furnish compelling reason to effect thorough and deep reform of many judicial systems.

C. Partial Remedies

It seems likely that effective remedies for intellectual property will become reliable and widely available in countries with currently weak judicial systems only after reforms upgrade those judicial system in general. Nonetheless, remedies can be instituted sooner which offer partial support for effective intellectual property remedies. Prominent among these are the creation of specialized courts, enhanced training for judges and provision of judicial tools for action. Opportunities for arbitration also deserve consideration.

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1. Specialized Courts

Notwithstanding the provisions of Article 41(5), some countries may decide to create specialized intellectual property courts. It is typical for judges in courts of general jurisdiction to lack specific or even general knowledge of intellectual property. Specialized courts tend to concentrate knowledge among a few judges and upgrade the quality of decision-making. Training can also be concentrated on those few judges.

Some countries have found that without creating specialized courts, the same concentration of knowledge occurs when intellectual property cases tend to be heard in particular courts. The courts in Rio de Janeiro have experienced this de facto specialization largely because the national industrial property institute and many of the major industrial property law firms are located there.

Whether specialized courts serve best at the level of first instance or first appeal has been debated. Panama has recently initiated new specialized courts at both the level of first instance and the level of first appeal. They are modeled on the well-regarded maritime courts. The United States created a specialized appellate court for patent cases in 1982 and it is reported to have increased the value of American patents through more uniform decisions. Germany and the United Kingdom have experience with specialized patent courts which, for the most part, are considered effective, although reforms have been urged and some implemented. Mexico is also beginning to consider specialized courts of first instance with some support from the World Bank being considered. Brazil's new law provides authority for the creation of specialized courts. n86

2. Training for Judges

A second and fairly obvious remedy forweak judicial performance is to provide training for judges. The concept is simple enough, but designing cost-effective training is complicated. Without the focus of specialized courts, presumably a great many judges will deserve training. How much training is enough? A few hours would be barely enough to identify the various forms of protection. A few days of training would be superficial but helpful. A week of training for all judges could impair an entire judicial system's backlog of pending cases.

The kind of training needed will depend on the formation of the judicial system in each country and on the nature of litigation procedures.

[*540] If judges already have some knowledge of science, training can emphasize legal concepts. If not, it maybe necessary to impart basic scientific knowledge. Where court procedures permit litigants to "teach" judges during the course of trials, training can be confined to general propositions. Otherwise, deeper training will be useful.

From a long-term perspective, training should begin during law school, and in some countries courses in intellectual property are being offered, not only to law students, but to engineering students as well. Training for those who will teach these courses is an urgent need in many developing countries and this too may be an appropriate object for technical assistance.

3. Tools for Judges

A trained judge without the tools to act is another expensive illusion. Legislative authority to order seizure of infringing goods, to order an immediate stop to infringements, to seek and impound evidence, to reverse the burden of proof, and to impose sentences severe enough to deter infringements, among other things, gives judges the tools needed to provide effective remedies. n87

Without going into great detail, the TRIPS articles regarding enforcement identify many of the needed tools. n88 Notwithstanding the limits placed on enforcement obligations by Article 41(5), it appears that these tools are to be made available to judges. For many developing countries, this will mean making adjustments to civil and criminal procedure codes by the year 2000. Training in the use of these tools may then be advisable.

The cost of providing these tools will be accounted for chiefly in terms of legislative time. Ongoing costs will involve expanded activities by police and prosecutors.

None of these three partial remedies is tamper-proof. Corruption and political influence can undermine them, as can poorly qualified judges. Yet presumably countries desiring to benefit from their intellectual property system will be encouraged to take at least these steps.

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4. Arbitration

While there are distinct limits to the use of arbitration in intellectual property disputes, their role can be useful. The World Intellectual Property Organization recently established an international arbitration center specialized in the resolution of intellectual property disputes among private parties. Its procedures can be an alternative to court litigation. Other non-specialized centers for general arbitration also provide this service.

VI. Technical Assistance

A. What is Needed

The extent and nature of technical assistance that would be desirable for developing countries will depend on the state of each country's current intellectual property system. Some will need more assistance than others. Much will also depend on whether the suggested cost reduction measures, such as adoption of a reference system for patents, are adopted. There may be some resistance, particularly among small countries, to aid offered directly by larger countries. Small countries often fear domination by donors and prefer aid from multilateral institutions.

Common to the greatest number of developing countries will be a need for assistance in creating protection for integrated circuit designs. Model texts, or at least sample laws, are needed. Integrated circuit design protection could benefit from international cooperation arrangements comparable to the Patent Cooperation Treaty's arrangements for patents. Something comparable to the reference system for patents can be adopted by individual countries even in the absence of an international treaty.

In developing countries which elect not to patent transgenic plants, there will be a need for assistance in creating protection for plant varieties. New plant varieties tend to be specific to countries or regions because of local soil and climate conditions. Still, the potential for cooperation in examination is considerable and model arrangements are availablefrom the UPOV secretariat in Geneva. Opportunities for cooperative global arrangements comparable to the Patent Cooperation Treaty exist. The secretariat is well prepared to assist countries introduce this type of protection and can offer model texts or sample laws. The

[*542] 1991 Act of the UPOV n89 deserves careful consideration in this regard as does the WIPO arbitration center.

As noted, the key to modern trademark administration is high performance software with phonetic and graphic capabilities coupled with training for those who use it. The good services of WIPO can provide access to and help with introduction of such software. Much the same can be said of industrial design protection.

For most countries, the extension of patent administration will constitute the area of greatest need. Suggestions for reducing related costs were noted above. Installing and upgrading computerized administration, training of personnel and access to on-line information constitute subjects for technical assistance from various sources. n90 Attention to cost accounting for patent and trademark administration can provide valuable information for effectively managing these functions.

Small countries, as well as some larger ones, will find it useful to have their older patents more readily accessible for searching when judging applications for utility models and patents involving lower levels of technology. To this end it would be useful if older patents going back fifty years or more were encoded into CD-ROM formats for key word searching.

As noted previously, bridge financing for fee postponement and for start-up costs for new functions will be desirable in many instances.

B. Sources of Aid

The main source of technical assistance will be the World Intellectual Property Organization. Assistance is available for its member countries and for non-member countries which are members of the World Trade Organization. The latter group became eligible for such assistance under an agreement between WIPO and WTO which took effect early in 1996. Substantial assistance is available from WIPO in both the design of administrative systems and in the training of people to implement them. The WIPO also provides an impressive library source of statutory material.

International financial institutions, led by the World Bank, may play a role. The World Bank has no internal division or department dedicated to intellectual property and only a few staff have familiarity with the subject. Still, some types of technical assistance are clearly

[*543] within the ambit of Bank programs, particularly those focused on strengthening public administration and fostering an improved environment for private economic activities. Regional development institutionssuch as the Inter-American Development Bank can play a complimentary role. Various United Nations agencies, such as the United Nations Development Program (UNDP), have provided funds for various aspects of reform ranging from training to administrative strengthening.

A few governments have also provided funds to developing countries for a range of reform efforts. The Japanese have quietly provided trust funds through various institutions including the World Bank. The United States has provided funds for system strengthening through the United States Agency for International Development (USAID) program and other channels. The United States Patent and Trademark Office and the European Patent Office also provide technical assistance.

A major obstacle to upgrading intellectual property systems is the lack of trained people qualified to conduct an effective public administration. In addition to training programs provided by WIPO, some specialized law schools have programs in intellectual property. The Franklin Pierce Law Center in Concord, New Hampshire, for example, offers a Masters in Intellectual Property for students from developing countries. The Max Planck Institute in Germany has also provided training and specific advice to many countries.

Private associations have also begun to provide useful assistance. By way of example, the Semiconductor Industry Association located in San Jose, California, has with the assistance of the United States Patent and Trademark Office prepared a model act for the protection of integrated circuit lay-out designs. It has been specifically designed for developing countries in that it reflects the TRIPS Agreement and keeps the burden of public administration to a minimum.

A detailed and comprehensive list of the various sources of technical assistance for developing countries would itself be a highly useful aid to many countries as they begin to seek help in complying with the TRIPS Agreement. An obvious place to start in seeking technical assistance is WIPO, but other sources might be investigated as well.

Not all assistance that might be desirable will be made available, of course. With well over one hundred countries revising and upgrading their intellectual property systems in the next few years, the available sources of technical assistance will be severely strained.

[*544]

VII. Closing Observations

The two greatest difficulties facing developing countries as they comply with their TRIPScommitments are the challenge to provide sustainable high-quality public administration and to offer effective judicial enforcement for intellectual property.

In the majority of cases, public offices which grant and maintain industrial property rights are not well prepared to cope with responsibilities which will expand abruptly at the turn of the century as a consequence of the TRIPS Agreement. To diminish the jolt, advance preparations are indicated.

Among those preparations are decisions regarding how patent administration will be financed and how patent examination will be conducted. Adequate financing of patent administration could be assisted by converting the patent office into a semi-autonomous institute with authority to retain the fees it receives and apply them to capital and operating expenses. A number of countries have made this shift recently.

Such offices then become quasi-profit centers. There is an obvious tension between charging high fees to enhance revenue and maintaining break-even fees to assure interest in investing in the country.

The increasing burden of patent examination can be largely relieved through adoption of the suggested "reference system." At the same time, the quality of patents granted by the country will be increased.

The inability of some developing countries' judicial systems to provide effective remedies for infringement of intellectual property rights extinguishes the credibility of that country's intellectual property system. This is felt most acutely by local citizens who might consider investing time and money in creative and inventive activities.

Judicial reform is essentially a matter of political will. Once it is more widely understood that a national economy suffers substantially for lack of an effective judiciary, deep and comprehensive reform can be achieved. In the meantime, the partial remedies of specialized courts, training for judges and authority for decisive precautionary actions will help.

Once adequately financed public administration and politically supported high-performance judicial remedies are in place, it can be expected that developing countries

will experience the solid economic benefits which flow from robust protection for intellectual property.

n1 Agreement on Trade-Related Aspects of Intellectual Property Rights, Apr. 15, 1994, Marrakesh Agreement Establishing the World Trade Organization, Annex 1C, Results of the Uruguay Round vol. 31, *33 I.L.M. 1125 (1994)* [hereinafter TRIPS].

n2 Copyright in this work is reserved by WIPO and publication herein is by permission of the author.

n3 WIPO General Assembly, Document WO/GA/XVI/7, Paragraph 24, Item 9 (Oct. 3, 1995).

n4 Pauline Newman and Robert M. Sherwood, Legal Framework of the Industrial Economy: Incentives for Technological Development - Judicial Systems and the Laws of Intellectual Property, in East-West Technology Transfers, 25-41 (Bugliarello, George, et al. eds., 1996).

n5 See Robert M. Sherwood, Intellectual Property and Economic Development, (1990) (out of print in English, available in Spanish and Portuguese translation).

n6 See id.

n7 Carlos A. Primo Braga, Trade-Related Intellectual Property Issues: The Uruguay Round Agreement and Its Economic Implications, in The Uruguay Round and the Developing Economies (World Bank Discussion Paper No. 307, William Martin & L. Alan Winters eds., 1995).

n8 To underscore this assertion, reference is made to a rating system developed by the author to permit comparison of national intellectual property systems. The system was derived from work performed for the InterAmerican Development Bank in the context of its Investment Sector Reform programs. See Robert M. Sherwood, Intellectual Property Systems and Investment Stimulation: The Rating of Systems in Eighteen Developing Countries, 37 IDEA 261 (1997).

n9 While the TRIPS level of protection is the highest global level yet agreed to, some regional agreements have established more robust requirements. See Robert M. Sherwood and Carlos Primo Braga, Intellectual Property, Trade and Economic Development: A Road Map for the FTAA Negotiations, in Institute of the Americas, Outlook for Free Trade in the Americas (Colleen S. Morton ed., 1996), and in Agenda Paper 21, North/South Center, University of Miami.

n10 Interview with Jorge Amigo, Director of the Mexican Institute of Industrial Property (IMPI), in New York, NY (May 18, 1995).

n11 Table 3, infra page 526, shows a five-fold increase in patent applications in South Korea between 1984 and 1993. About 45 percent of the applications are currently made by Korean residents.

n12 See Gene M. Grossman and Elhanan Helpman, Innovation and Growth in the Global Economy (1991).

n13 See, e.g., Keith E. Maskus, Intellectual Property Rights in the Global Information Economy, in John Deutsch Institute, Policy Framework for a Knowledge Economy (T. Courchene ed., 1996).

n14 Visit "http://www.vita.org/technet/knowarch" to view the proceedings. See also John A. Armstrong, Trends in Global Science and Technology and What They Mean for Intellectual Property Systems, in National Research Council, Global Dimensions of Intellectual Property Rights in Science and Technology, 192-207 (Wallerstein, Mogee and Schoen eds., 1993), for a discussion of the influence of intellectual property in relation to cooperative research at the global level.

n15 A "pipeline" provision would permit the grant of patents to inventions which are made prior to the effective date of the change in the law but whose resulting products have not yet reached the market. These products are said to be still in the pipeline, on their way to market.

n16 This study does not attempt to systematically review or summarize that literature. A concise review appears in Fundacion de Investigaciones Economicas Latinoamericanas (FIEL), Protection of Intellectual Property Rights: The Case of the Pharmaceutical Industry in Argentina (1990) at 11-18. Other particularly cogent works are Kenneth J. Arrow, Economic Welfare and the Allocation of Resources for Invention, in National Bureau of Economic Research, Princeton University, The Rate and Direction of Inventive Activity (1962); M. L. Burstein, Diffusion of Knowledge- Based Products: Applications to Developing Countries, Western Economic Association International, Volume XXII, No. 4 Economic Inquiry (October, 1984); Edwin Mansfield, Intellectual Property Rights, Technological Change, and Economic Growth, in Intellectual Property Rights and Capital Formation in the Next Decade (Charls Walker and Mark Bloomfield eds., 1988); and Edwin Mansfield, Mark Schwartz, and Sam Wagner, Imitation Costs and Patents: An Empirical Study, Economic Journal (December 1981). For a concise extension of this literature to the field of copyright, see Robert P. Benko, Intellectual Property Rights and New Technology, in Intellectual Property Rights and Capital Formation in the Next Decade (Charls Walker and Mark Bloomfield eds., 1988).

n17 See generally, Gianfranco Jori, The Impact of Pharmaceutical Patents: The Italian Experience (1988) (unpublished monograph, on file with FIEL).

n18 Price controls may have played some part in this result.

n19 There are indications that not all "pirated" products are marketed at prices lower than original products. One study of the pharmaceutical market in Argentina suggests that in many instances, imitation products have been priced near or even above the price of research-derived original products. Fundacion de Investigaciones Economicas Latinoamericanas, supra, note 16. To the extent that this is the case, the introduction of trade-enhancing protection for patents, as under the TRIPS Agreement, may not produce significantly higher prices. It can be argued, of course, that the prices of original products have been held down by the threat of imitation products. In countries without patent protection, original products typically enter the market first, with imitation products entering later, and can have an influence on entry prices.

n20 Of course, price fixing among companies may occur both before and after patent law changes, depending on other laws and their enforcement.

n21 See Kenneth W. Dam, The Economic Underpinnings of Patent Law, *23 J. Legal Stud., 247-71 (1994).*

n22 Id.

n23 See id.

n24 Arvind Subramanian, Putting Some Numbers on the TRIPS Pharmaceutical Debate, Int'l J. Tech. Mgnt, Special Issue (1995).

n25 The common market for Argentina, Brazil, Paraguay, and Uruguay.

n26 See Edwin Mansfield, Intellectual Property Protection, Foreign Direct Investment, And Technology Transfer (International Finance Corporation of The World Bank Group Discussion Paper 19, 1994) [hereinafter Mansfield Discussion Paper 19]; Edwin Mansfield, Intellectual Property Protection, Direct Investment, And Technology Transfer: Germany, Japan and the United States (International Finance Corporation of The World Bank Group Discussion Paper 27, 1995) [hereinafter Mansfield Discussion Paper 27].

n27 Such techniques are commonly used in countries with non-robust intellectual property systems. The resulting inefficiencies are likely to seriously hamper industrial competitiveness.

n28 For example, after Brazil enacted copyright protection for software in late 1987 and liberalized import policies, local software producers wrote applications programs under commodity programs such as Lotus 123 and then moved to customized programs which helped local industry streamline production methods.

n29 TRIPS, supra note 1, art. 27, *33 I.L.M. at 1208.*

n30 See Mansfield Discussion Paper 19 and Mansfield Discussion Paper 27, supra note 26.

n31 The fourteen leading developing countries were Argentina, Brazil, Chile, Hong Kong, India, Indonesia, Mexico, Nigeria, the Philippines, Singapore, South Korea, Taiwan, Thailand and Venezuela.

n32 Mansfield Discussion Paper 19 , supra note 26.

n33 Mansfield, Discussion Paper 27, supra note 26.

n34 For example, in the post-1978 experience in Italy, many "pirate" firms adjusted to patent protection and eventually survived, licensing from or merging with other companies and turning to research-based products.

n35 See Robert M. Sherwood, Intellectual Property Systems and Investment Stimulation: The Rating of Systems in Eighteen Developing Countries, 37 IDEA 261 (1996).

n36 In one example, a leading Brazilian financial group formed a venture capital company a decade ago, only to learn by trial and error that the intellectual property

system of the country was too weak to permit them to pursue this activity. They subsequently converted to merchant banking.

n37 Guntram Rahn, The Role of Industrial Property in Economic Development: The Japanese Experience, Max Planck Institute for Foreign and International Patent, Copyright and Competition Law, 14 International Review of Industrial Property and Copyright Law IIC, 449-92 (1983).

n38 The assessment which follows has been assisted by conversations with intellectual property system administrators in Argentina, Bahamas, Barbados, Brazil, Colombia, Costa Rica, Ecuador, El Salvador, Mexico, Pakistan, Panama, Paraguay, Russia, and Uruguay. Officials at the United States Patent and Trademark Office have also provided helpful comments.

n39 See Table 3.

n40 See Paris Convention for the Protection of Industrial Property, Mar. 20, 1883, as last revised July 14, 1967, *21 U.S.T. 1583,* 828 U.N.T.S. 305 [hereinafter Paris Convention]; Berne Convention for the Protection of Literary and Artistic Works, Sept. 9, 1886, as last revised July 24, 1971, 828 U.N.T.S. 221 [hereinafter Berne Convention]; International Convention for the Protection of Performers, Producers or Phonograms, and Broadcasting Organizations, Oct. 26, 1961, 496 U.N.T.S. 43 [hereinafter Rome Convention]; Treaty on Intellectual Property in Respect of Integrated Circuits, opened for signature May 26, 1989, *28 I.L.M. 1477* [hereinafter Washington Treaty].

n41 Article 62 is not qualified by any provision similar to Article 41(5). Thus countries may not justify failure to meet their public administration commitments for lack of resources or because public administration in general is deficient.

n42 Some authors simply mail a copy of the work to themselves. When received they leave the envelop sealed. The postmark records the date of the mailing, thus establishing the date of the work. If necessary, the envelope can be opened later, perhaps in court, to complete the evidentiary objective.

n43 Paris Convention, supra note 40, art. 5 quinquies, *21 U.S.T. at 1639.*

n44 Hague Agreement Concerning the International Registration of Industrial Designs and Models, June 2, 1934, 205 L.N.T.S. 179, as amended at the Hague, Nov. 28, 1960 [hereinafter Hague Agreement].

n45 TRIPS, supra note 1, art. 26, *33 I.L.M. at 1207.*

n46 Paris Convention, supra note 40, art. 4, *21 U.S.T. at 1631.*

n47 The requirement has also been used (abused?) as a way to provide competitor firms with patent applications filed abroad, even though such applications are available to the public in due course through publication.

n48 This is a reference to the International Convention for the Protection of New Varieties of Plants, Dec. 2, 1961, *33 U.S.T. 2703,* 89 T.I.A.S. 10199 [hereinafter UPOV]. The UPOV treaty had 30 member states as of April 1, 1996.

n49 Revisions to the UPOV arrangements proposed by the 1991 Act (not yet in force) would extend wider protection to plant varieties including those derived from genetic engineering.

n50 For an excellent introduction to this subject and the public administration it entails, see UPOV, Pub No. 408(E), General Information (1995).

n51 Washington Treaty, supra note 40. This treaty has not yet come into force for failure of sufficient accessions.

n52 A model law prepared by the Semiconductor Industry Association in cooperation with the United States Patent and Trademark Office offers options for protection without recourse to establishment of a registry, in effect coming close to the concept of copyright.

n53 Trademark Law Treaty, October 27, 1994, in WIPO, Industrial Property and Copyright, Industrial Property Laws and Treaties, Multilateral Treaties 1 (Jan. 1995) [hereinafter Trademark Law Treaty].

n54 Agreement of Madrid for the International Registration of Trademarks, Apr. 4, 1891, 583 U.N.T.S. 3 [hereinafter Madrid Agreement].

n55 Madrid Protocol Relating to the Madrid Agreement Concerning the International Registration of Marks, June 27, 1989, WIPO Pub. No. 204(E) [hereinafter Madrid Protocol].

n56 Patent filing practice differs considerably from one company to another, even in the same industry. Companies try to evaluate the eventual importance of each invention within the first year, filing in a long list of countries if they deem the invention will be of major importance, and in only a few if an invention is deemed of lesser importance. They often guess wrong. Universities are similarly constrained.

n57 The Brazilian patent office budgeted for a thirty-five percent increase in patent applications during 1997 in response to patent law reform which takes effect in May 1997. This law is close to parity with TRIPS.

n58 Patent Cooperation Treaty, June 9, 1970, *28 U.S.T. 7647* [hereinafter PCT].

n59 Id., art. 16, *28 U.S.T. at 7662.*

n60 Id., art. 9, *28 U.S.T. at 7656.*

n61 Id., art. 12, *28 U.S.T. at 7658.*

n62 Id., art. 11, *28 U.S.T. at 7656.*

n63 Id., art. 15, *28 U.S.T. at 7660.*

n64 Id., art. 20-21, *28 U.S.T. at 7666.*

n65 Id., art. 22, *28 U.S.T. at 7667.*

n66 Id., art. 39, *28 U.S.T. at 7685.*

n67 Searches and preliminary examinations are non-binding under the PCT and errors are known to have been made. This leaves some residue of burden with local patent offices. However, there is a trend among developing countries to postpone questions of this sort until after grant and leave their resolution to the courts.

n68 Use of the PCT is growing rapidly, with an increase at the international level of twenty-four percent in the first six months of 1996 over the comparable year-earlier period (information supplied to author by WIPO official, July, 1996). Practice under the PCT appears to vary from industry to industry depending somewhat on product life-cycle. Several major companies operating on a world-wide basis have recently decided to narrow the list of candidate countries early in the application process and proceed directly to obtain protection.

n69 Patent Cooperation Treaty, supra note 58.

n70 See EPO-USPTO Examiner Exchange Program Final Report, 72 J. Pat. & Trademark Off. Soc'y, 5-58, 621-690 (January & July, 1990); and Derek Haselden, Report on Search Comparison: UK, Europe & USA, J. Chartered Inst. Pat. Agents UK, 1996, at 250-261. Both studies indicate high uniformity of outcomes for examination of corresponding applications. Differences tended to reflect constraints imposed by respective patent laws rather than fundamental differences in examination techniques. Search capability has improved since these studies were conducted. Little comparative study of other examining authorities has been done. Search results are doubtless influenced by language barriers. Efforts to further reduce differences are being made.

n71 This will be true for many types of inventors. Small individual inventors are surely affected. Universities which have technology licensing policies have reported loss of licensing potential for lack of funds to pursue patent applications. Even large companies with active patent programs reach cost constraints and will trim the number of countries in which patents are filed.

n72 Postponement is not the same as fee reduction, something offered to "small" inventors in many countries. With regard to the PCT, a reduction of seventy-five percent is available beginning in 1996 for the basic fee, designation fee, confirmation fee and handling fee in respect of international applications filed by natural persons who are nationals and residents of countries with per capita incomes below $ 3,000 dollars. See WIPO Int'l Bureau doc. no. PCT/GEN/13 Rev.1 (1995).

n73 The world is probably not yet ready for the suggestion that any patent application presented in English could serve without the need for translation, but most scientists today who might be reading patent applications to enhance their understanding are likely to function in English. The Internet is swiftly propelling English further to the forefront as the universal language for information technology.

n74 See Franklin Pierce Law Center's Fifth Biennial Patent System Major Problems Conference, 36 IDEA 350, 350-82 (1996).

n75 TRIPS, supra note 1, art. 42, *33 I.L.M. at 1214.*

n76 TRIPS, supra note 1, art. 43, *33 I.L.M. at 1214.*

n77 TRIPS, supra note 1, art. 44, *33 I.L.M. at 1215.*

n78 TRIPS, supra note 1, art. 45, *33 I.L.M. at 1215.*

n79 TRIPS, supra note 1, art. 46, *33 I.L.M. at 1215.*

n80 TRIPS, supra note 1, art. 47, *33 I.L.M. at 1216.*

n81 TRIPS, supra note 1, art. 48, *33 I.L.M. at 1216.*

n82 See Ricardo Haussman, La Economia Politica de la Reforma Judicial en America Latina y el Caribe, in InterAmerican Development Bank, Judicial Reform Conference (October, 1995).

n83 See Robert M. Sherwood, Geoffrey Shepherd and Celso Marcos de Souza, Judicial Systems and Economic Performance, 35 Q. Rev. Econ. & Fin., Special Issue, Summer, 1994, at 101-116.

n84 For a compelling recent analysis, see Christopher Clague et al., Contract-Intensive Money: Contract Enforcement, Property Rights, and Economic Performance, IRIS Center, University of Maryland, Working Paper No. 151 (1995)

n85 See e.g. Sherwood et al., supra note 83.

n86 Law No. 9279/96 of May 14, 1996, art. 241 (Brazil).

n87 Such tools are available and work well in civil code systems. See Christina Moeckel, Civil Enforcement of Intellectual Property Rights in Germany, France and Italy (1996) (monograph distributed by the National Law Center for InterAmerican Free Trade)

n88 See TRIPS, supra note 1, art. 41-50, *33 I.L.M. at 1213-16.*

n89 See UPOV, supra note 48.

n90 Several registry officials have stressed the need for more comprehensive information regarding the state of the art in computerization and on-line services.