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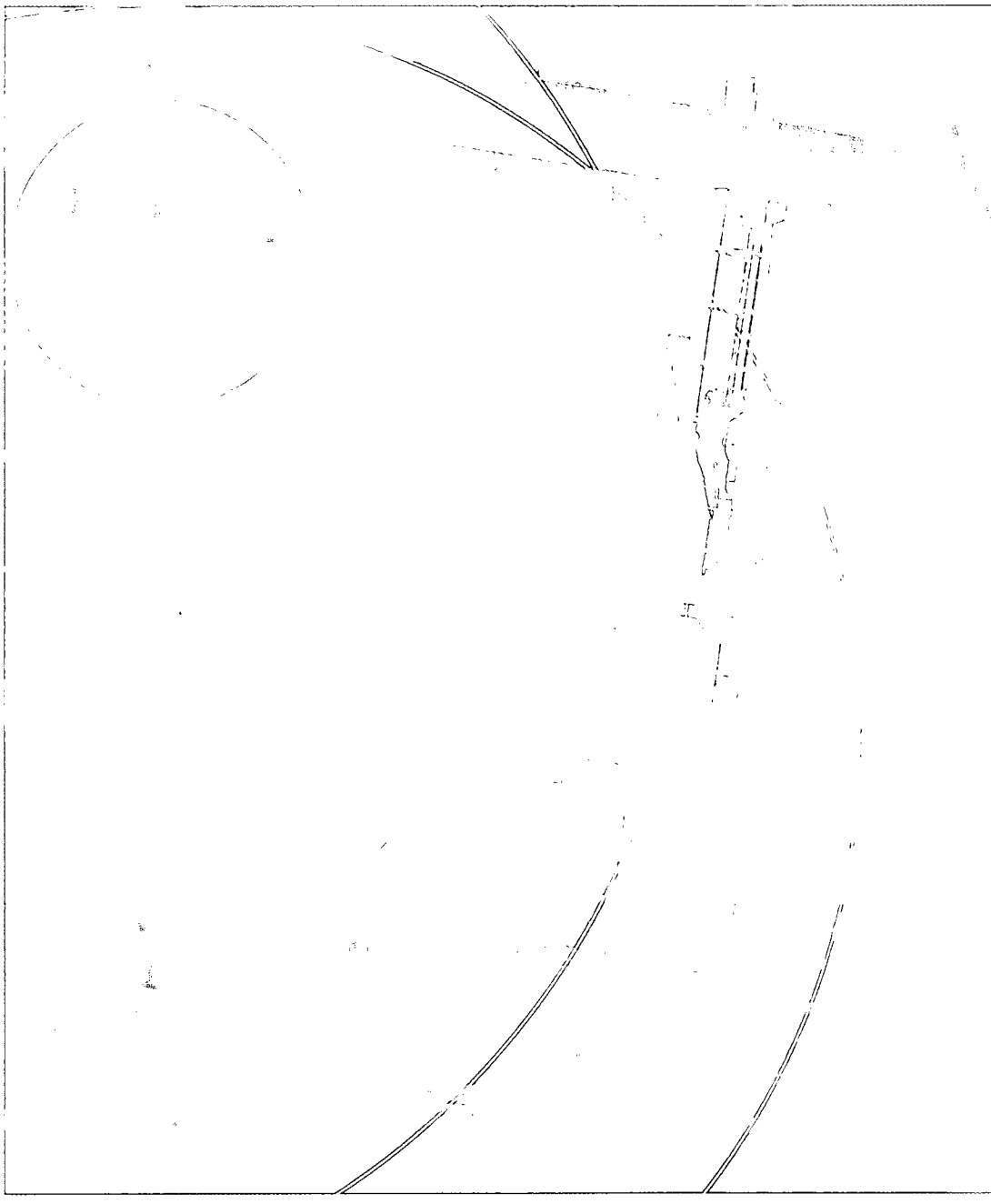
Technology transfer operations,

including agreement formulation and negotiation



UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION

economy environment employment

TRAINING PACKAGE ON INVESTMENT AND TECHNOLOGY PROMOTION

Technology transfer operations,

including agreement formulation and negotiation

UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION
Vienna, 2004

Contents

SUMMARY

I. Technology and innovation

A. The importance of technology

Technology has been widely recognized as an engine of economic growth. It has an impact on and is itself impacted by a number of elements such as the size of research and development (R&D) expenditure, the development of human capital and investments pertaining to the diffusion and promotion of technical change. It is also known that international trade is greatly affected by the relative ability of countries and organizations to master technologies and capture innovations. As a result, past investment and accumulated knowledge form a "virtuous circle" in which physical and intangible investments are mutually reinforced.

It is, therefore, essential for nations and corporations to know and understand the changing competitive environment and the factors that affect it, such as trade policies, regulations, globalization and the increased power of the customer. Change is a key element in technology and technology development, and technology is the major source of maintained competitive advantage.

B. The innovation process and the role of technology transfer

Innovation is essential for creating and sustaining competitiveness nationally and internationally. The innovation process is the process by which corporations and nations link the creation of new ideas with markets (internal and external) through management of knowledge and of human and physical resources. It is an interactive process in which all the elements have an impact on each other. Its discipline combines the major elements of corporate functions into one holistic approach.

Technology transfer is the mechanism by which the accumulated knowledge developed by a specific entity is transferred wholly or in part to another one to allow the receiving party to benefit from such knowledge. It allows the receiver to significantly speed up entry into new fields and to reduce costs on existing products.

Thus, when managed appropriately, technology transfer allows nations or corporations to increase their stock of production and innovative resources, to further the exploitation of local resources and to increase productivity. It increases gross national product by opening up new segments, accelerates the rate of growth and enhances productivity, provided there is alignment between technology transfer and economic strategies.

Technology transfer can have a significant influence on foreign trade and the balance of payments through multiple substitution effects.

C. An intellectual capital model

In historical times, different elements were the source of wealth. Up to the 1800s, land ownership was the primary component of fortunes; the industrial revolution then established factories as the basis for wealth. Since the 1990s, however, knowledge has supplanted hard assets as the source of enrichment. As a result, traditional reporting (balance sheet and annual reports) has become mostly irrelevant. In 1998, for instance, the average market to book ratio of the Standard and Poor's 500 companies stood at 5.6 (versus 1 in 1982).

Why the shift? Four major reasons:

- The effect of the Internet and its instantaneous dissemination of knowledge
- The leveraging effect of knowledge and of intellectual capital
- The changing legal environment providing improved protection for knowledge and intellectual property

- The globalization of legal protection through Trade-related Aspects of Intellectual Property Rights

For those reasons, new studies are now under way to measure intangibles more accurately and a new business model has been emerging. In such a model, intellectual capital and its two primary components (human capital and intellectual assets) are leveraging the traditional hard assets (structural capital). Such leveraging is made possible through innovation processes and knowledge management.

D. Mechanisms of technology protection

There are four main mechanisms of technology protection: trade secrets, patents, copyrights and trademarks. Some technologies can be protected by all four mechanisms.

All new technology and innovation start as trade secrets, sometimes also called confidential or proprietary information. From there on, the trade secret may remain as such provided the right steps are taken, or it may become public information, protected or not.

If a corporation decides to protect a given technology further, it will apply for a patent or a copyright. In such a case, in exchange for making the invention (or part of it) public, the corporation may be granted a monopoly right for a given period of time. A patent is a grant from a Government to exclude others from making, having made, using, selling or offering to sell in or import into their territorial jurisdiction the claimed invention. To obtain a patent, the disclosure must be novel, useful, non-obvious and enabling. Most countries grant that kind of protection. A number of global and regional treaties and conventions exist either to facilitate the grant of a patent or to enforce it. The Patent Cooperation Treaty, the Trade-related Aspects of Intellectual Property Rights and the European Patent Convention are among the most noteworthy.

Copyrights are used to protect the writings of an author from being copied. They do not protect a technology or innovation per se, only its expression. Copyrights are widely used for protection of computer software, in particular outside the United States of America. Copyright protection is automatic but can also be registered.

When the product of an invention or the concept of it becomes well known or may become well known, corporations also have access to trademark protection. Trademarks are used to indicate the origin of goods or services and to distinguish them from others, so they can be a powerful tool. Some trademarks are registered; others are not.

International treaties and conventions apply also to both copyrights and trademarks.

II. Technology acquisition

A. Mechanisms of technology management

Modern thinking considers two distinct aspects of technology management, the value creation mode and value extraction mechanisms.

Value creation is centred for the most part on innovation processes and the underlying aspects of an enterprise. The focus is on the human side—the human capital. The human capital is the capital that can literally walk out of the office or leave the nation. It is, therefore, extremely critical to establish processes, known as knowledge management, to transfer the ideas, the knowledge and creativity of the human factor into a more tangible form such as intellectual assets. Intellectual assets belong to a corporation or a State. Human capital does not.

Intellectual assets are at the core of the value extraction mechanisms. Besides intellectual assets, value extraction mechanisms include elements such as decision and management processes (e.g. strategic planning or competitive analysis) and "practised" processes. The emphasis is on practised rather than published. It will also include organizational capability, in particular in newly established organizations or developing countries.

Only a finite number of mechanisms are available to extract value from intellectual assets: outright sale, donation to non-profit organizations (in the United States only), straightforward licensing, entering into a joint venture or alliance, preventing competition from using the technology and using it in an existing business or a new one. Which mechanism to select will be discussed later.

B. Core competences

C. K. Prahalad defines core technologies as those specific technologies which will allow a corporation to sustain a competitive advantage over time. It is critical for a corporation to define its core technologies correctly and to define them narrowly enough to differentiate itself from its competitors and to be able to manage its technologies effectively.

The management of core competences should include at least the functions of R&D, personnel, business (strategy) and intellectual property (IP) protection. It will emphasize strengths and weaknesses as well as gaps and potential threats.

It is essential to first determine the core competences of a corporation (or of a nation) before any other technology management is considered.

C. The selection process

The selection of technology to be acquired will depend on a combination of internal and external factors and will include the assessment of advantages and disadvantages of moving forward. Crucial elements to consider are:

- Company technological growth (past and foreseen)
- Assessment of present or future competitive advantage needed and available
- Company's capability (technological, manufacturing, managerial and sales/marketing)
- Time needed to market and the marketing window of opportunity
- Potential of failure and risks associated with it
- Cost and affordability factors.

It is critical to first investigate the internal R&D option and then, based on a clear assessment of the external environment, to decide which of the available options to pursue. Each of the various technology acquisition options described earlier has its own rate of success, advantages and disadvantages and level of complexity and difficulty, depending on the particular situation and the desired outcomes.

D. Barriers and determinants

There are numerous barriers and determinants to a successful technology transfer. Some are of an internal nature, such as the need of the user and its R&D capability. Others are external, such as market conditions, industry concentration and geographical concentration of competition. Each of those factors has to be evaluated and measured before, during and after the technology acquisition process.

It is necessary at that stage to develop a well defined process to move forward, such as the stage-gate process, which should include:

- A system to understand the costs and risks as well as the associated benefits
- To clearly understand the application or intended application of the technology being acquired
- Several gates with "Go"/"No go" decisions associated with a re-evaluation of the risk benefit ratio

A more in-depth description of project management techniques is given in other modules.

Of particular importance is an evaluation of the general price determinants of the technology, which

will have an impact on negotiation and final values. For developing countries, it is necessary to assess the relative access to information, the relative bargaining power of the parties, the availability of alternatives and the knowledge or lack of it of the acquirers.

III. Technology sourcing

A. Overview

Many developing countries have a relative weakness in the field of technology sourcing as a result of multiple factors. Those factors are related to a less developed information infrastructure, geographical remoteness, limited language skills and weakness in interpretation experience.

The advent of electronic information has somewhat reduced those handicaps, as multiple sources of information, private and public, are now available on the Internet.

Governmental type sources include national ones, such as national patent offices, and international ones such as the United Nations Industrial Development Organization, the World Intellectual Property Organization and the European Patent Office. Private sources include corporations, industrial or professional associations, universities, scientific publications and journals. It is recommended to search those sources first on the Internet whenever possible to expedite and simplify the process.

B. Strategic analysis of opportunities

In order to find technology effectively and efficiently, it is essential to start with a strategic analysis of technology choices. Such a strategic analysis should include an initial inventory step ("Where are we now?"), followed by a clear vision of what the final results should be ("Where do we want to go?"). Only when those two factors have been determined can a sourcing strategy be initiated. The initial analysis should include:

- Competitive analysis of the market and its characteristics, such as the "five forces" model
- A thorough understanding of the market needs and how to fulfil them
- A benchmark of the best competitors; the results of the total analysis need to be correlated with one's own strengths and weaknesses

C. Tools and methods

A number of tools have been developed over the last 10 years to facilitate finding potential sources of technology. Such tools were developed principally to analyse patent portfolios.

The most important tools include citation analysis, patent trees and patent mapping. Citation analyses are based on technologies and patents that have to be cited as prior art in the prosecution of a new patent. Computerized models allow all relevant patents in a defined field and new entrants in the field to be determined quickly. Such tools are extensively used for competitive analysis.

Patent trees and patent mapping make it possible to analyse trends and define potential replacement technologies. Patent trees are a combination of succeeding and parallel patents pertaining to a given technology. Patent maps are more complex models mapping into a three-dimensional model a technology field, based on the underlying patents. Those tools are available through a number of sources.

A number of specialized Internet sites can help locate which technologies are available, from whom and for what applications.

D. Assessment

Once the decision has been made to pursue a certain technology, it is important to assess that technology in the context of the possible acquirer. It is not a substitute for a more formal valuation (pricing), which will take place later in the negotiation process.

Assessment of the technology will take into consideration the life cycle of the product issued from the technology, as well as the life cycle of the technology itself. Those factors will greatly affect its potential benefit. The assessment will evaluate the appropriateness of the technology for the acquirer and its inherent risks. That is a qualitative rather than a quantitative evaluation, based mostly on the context and the environment of the future development. It will make it possible to identify the potential requirements of the acquirer that will need to be answered in the ensuing negotiation.

IV. Negotiations and valuation

A. Principles of negotiation

A negotiation is not something to be entered into lightly. It is vital to prepare correctly for it even before contacting the other party. Effective negotiating requires thorough planning and organization: planning of the desired outcome, its limits and its alternatives, and organization of the negotiating teams, their roles and their composition. Planning will include obtaining as much information as possible on the other party (or parties), independently of the technology involved.

Planning will be even more critical in negotiations of unequal power, such as between large and small entities or between parties with significant cultural or language differences.

Planning is continuous during the negotiation process. It includes an assessment of what is being learned during the negotiation and its comparison with goals and preparation for the next steps.

Before entering into negotiations, each party needs to have a good understanding of its own negotiation parameters: needs versus wants, acceptable boundaries and the best alternative to a successful outcome.

Negotiations should be conducted in a fair and ethical manner. An agreement where one of the parties feels cheated is a doomed agreement. Parties have to learn to listen to each other for clues and input on their respective needs. Those needs have then to be compared with their own needs and desired outcome in order to close the negotiation gap quickly. Negotiation involves intent and careful listening.

Other than for the simplest negotiation, one or several teams need to be assembled. Typically, such teams are a preparation and planning team, a core negotiating team, a support team during the negotiations and an implementation team. Such teams are interdependent and multifunctional. One or several of the team members will belong to more than one team in order to maintain continuity. The functions represented will vary from negotiation to negotiation and from team to team.

Teams should have clear discipline and well established leadership. They should be well prepared, possibly through role playing. The negotiation team, in particular, should be small. It should be empowered to take decisions. Members should have well defined roles and responsibilities.

In intercultural negotiations, special care should be taken to understand how the parties expect the negotiation process to evolve and to prepare for it. When more than one language is used or when uneven knowledge of the negotiation language is apparent, extra time and care is needed. The use of interpreters should be carefully controlled; their role has to be restricted to interpreting only.

Negotiation has to occur layer by layer according to a well orchestrated and laid out plan. Each issue agreed upon has to be compared with the goals set and recorded.

B. Valuation

Pricing is one of the most difficult issues in a negotiation, but only rarely is it the reason for failed negotiations. Pricing has to be considered in the context of the total deal, as many other elements in a contract will affect its value.

Consider different modes of payment and their impact on the deal before entering into pricing discussions; understand the risk involved with long-term payments; also, make sure the items to be valued are well defined and understood. Value may also change over time and may have an impact on the profitability of the deal.

Payments can occur in several ways: lump sum, deferred or continuous, such as royalties. They can also be in services or goods.

In principle, royalty rates are determined as a portion of the expected profit made from the technology. The relative share of profits is determined by the relative risk of the parties.

Four major methods are used to determine value:

- Cost
- Market comparables
- The 25 per cent rule
- Net present value (NPV)

The market comparables method is to examine like technologies that have been licensed in similar conditions. The difficulty is to find publicly available data as a basis for comparison.

The cost method determines either the cost to develop the technology or the cost to avoid the technology. The latter is usually the high limit; the former has little to do with actual value. It is used mostly in early-stage technologies when no other method is available.

The NPV method defines the profits to be generated by the technology over the life of the agreement. It then brings that total value back to the present time and finally assigns a proportion of the potential profits to each party. It requires the development of a pro forma business plan. It is the method used most often, together with the comparables method.

The 25 per cent rule arbitrarily fixes the relative proportion of benefits between the two parties at 25 per cent.

It is necessary to use more than one method in order to determine a valuation range for the technology.

V. Agreements

A. Principles and types

Once an agreement has been reached, it is time to draft a formal document. A well established process is needed to avoid unintended consequences for the corporation, to make sure that the intent of all stakeholders has been taken care of and to ensure management buy-in.

The contract should be fair, correct and well balanced. It should be in clearly understandable language. The minimum requirements and conditions needed to implement the deal should be covered. Which party drafts the agreement is not critical if it is balanced. The non-drafting party should assess the fairness of the drafting and not hesitate to redraft it if not satisfied with it.

Agreements can be categorized as follows:

- Preliminary agreements, which usually are the preamble to more complex partnerships. They include secrecy or confidentiality agreements, evaluation and non-analysis agreements and option agreements.

- IP rights agreements, which include patents, know-how, copyrights, trademarks and combinations thereof. Such agreements assign rights to use the IP rights with qualifications and restrictions to the user defined in the contract.

- Development and collaboration agreements, including joint ventures, alliances and joint R&D. Such agreements are generally more complex in nature and include IP rights clauses. They are usually the outcome of either another collaborative agreement or an IP rights agreement. More information about this type of agreement is given in other modules of the course.

B. The general structure of agreements

Contracts are usually composed of several major elements:

- The introduction, or recitals, which define the parties and the reasons for entering the agreement.
- The definition section, which explains the exact meaning of words or expressions in the agreement.
- The grant of rights defines what is actually granted or allowed and its restrictions.
- The obligations of the transferor and transferee will specify what each party is supposed to do and/or deliver. It generally includes payment obligations by the transferee and grant-back or grant-forward obligations.
- The general conditions section includes legal elements such as governing law, dispute resolution mechanisms, warranties, duration and performance clauses. It includes what is generally referred to as "boilerplate". Such boilerplate items can be costly to the parties and need to be carefully negotiated.

VI. Implementation and follow-up

A. Implementation

The final phase of the technology transfer is the actual implementation of the negotiated and drafted agreements. In itself, it is a project with a beginning and an end. It needs action-oriented phase reviews and specialized teams. A structured and well followed process is required to provide the teams with a road map and ways to measure their progress.

The process can be divided into three distinct phases, depending on technology maturity:

- Transfer into R&D
- Development into R&D
- Transfer to commercializing unit

It is similar to the stage-gate process with a "Go"/ "No go" decision at each of the defined gates (usually seven). Some of the steps can be shortened if the technology transferred is already well developed.

A number of management tools exist to help project planners design and conduct implementation projects, such as flow charts (explain the flow of work), milestone status reports (fixes dates for each important milestone and compares planning versus actual) and Gantt and S-curve charts (usually illustrate milestone status reports).

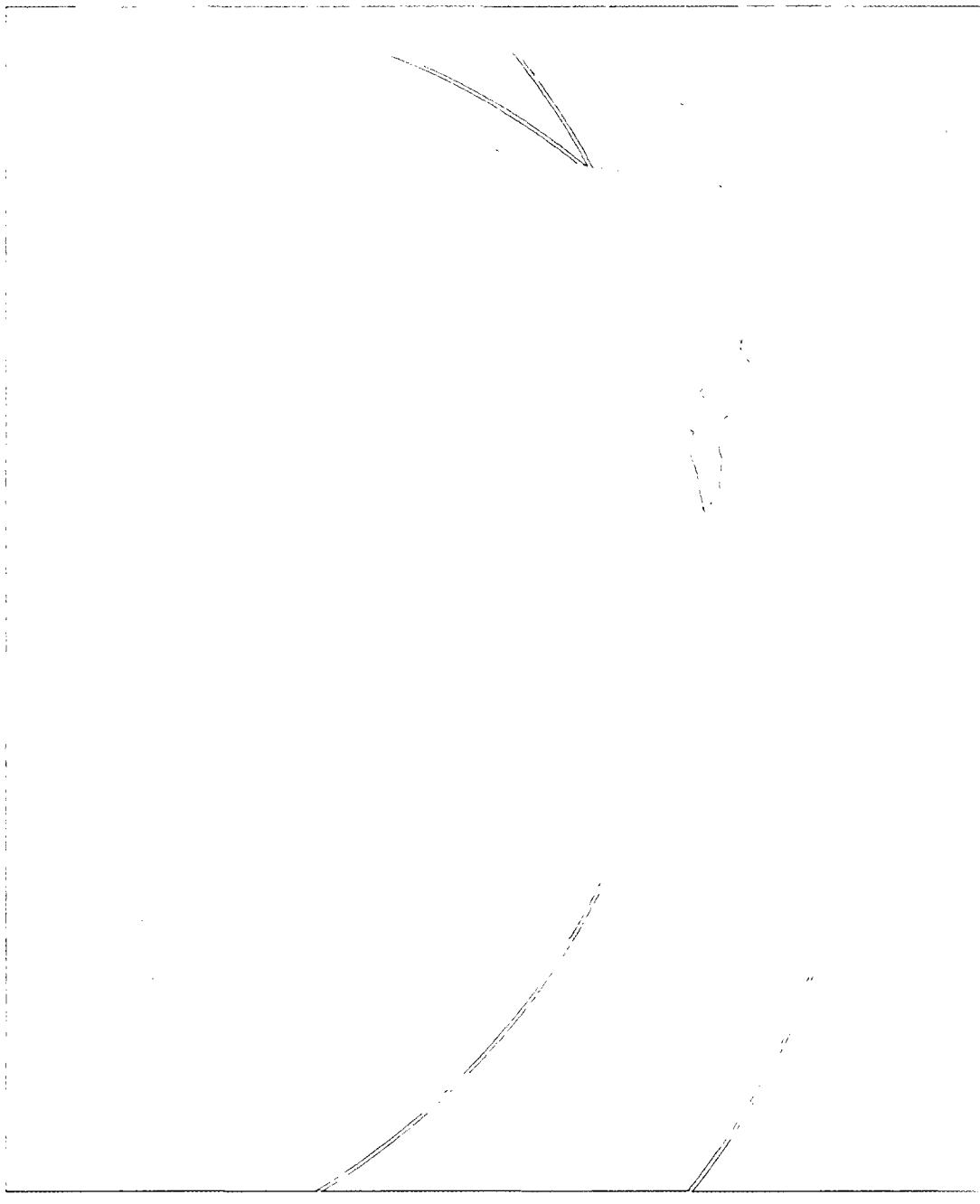
It is important to modify those implementation plans to fit with reality and to communicate such changes to the appropriate stakeholders.

B. Follow-up and documentation

Once agreements have been negotiated and implementation is in progress or completed, it is important to follow up. That will minimize problems later on.

As a requirement for a successful follow-up, proper documentation of the agreements and actual transfer process is needed. Such documentation should be kept centrally and responsibility for it clearly assigned, in particular in case of change of ownership or personnel.

I. TECHNOLOGY AND INNOVATION



I. TECHNOLOGY AND INNOVATION

A. The importance of technology

1. Overview

Innovation is essential for creating and sustaining a competitive business. Similarly, innovation-based advantages are a prerequisite for nations and corporations to remain competitive in international commerce. International trade, in turn, is greatly affected by the relative ability of countries and organizations to sustain their technology innovation.

Importance of technology

- Competitiveness of business
- Economic growth of nations
- International trade

Technology and development

- Technology and competitiveness
- Technology and economic and social development

Innovation and technological development

It has been recognized that technology is an engine of economic growth. The size of R&D expenditure, the development of human capital and the size and quality of investments in the diffusion and promotion of technological change have an impact on it.

Past investments and accumulated knowledge form a "virtuous circle" in which physical and intangible investments are mutually reinforced.

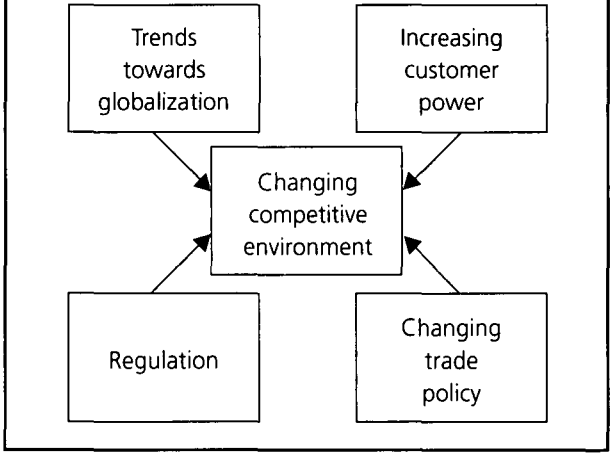
2. The need for change

Change without some sense of direction is unlikely to succeed. Technological change needs guiding and managing; there are no guarantees of success, but some useful lessons from experience can improve one's chances. The first step is to understand the nature of the threats and opportunities that operate in the environment in question—how to search for the signals, how to interpret the signals and how to select the options that are likely to have most effect on competitive survival.

Today's challenges take many forms, ranging from direct threats, such as increased competition or technological substitution, through to new opportunities opened up by emergent technologies or the development of new markets. Some of the most significant of those trends will be looked at in more detail.

In addition to the changing basis on which competition is now taking place, it is also necessary to be aware of the changing environment in which it takes place. There are many factors influencing it, including increasing trends towards globalization; increasing customer power; changing regulatory patterns; and increasing trade liberalization.

The changing competitive environment



The challenge begins with realizing that such factors are real and that they have an impact on business. It does not stop there, however. Impact specifics must be understood and strategies for dealing with those factors need to be developed and implemented to ensure continued survival.

When Henry Ford built his Model T in the 1920s, he created an approach to its manufacture which, for its time, was probably the most efficient in the world. Cars could be produced from raw iron ore in just over three days, quality was high and scrap levels low, inventory flowed through the plant with very little tied up in wasteful queues and the whole plant achieved extremely high levels of productivity. The improvements in productivity continued until the early 1920s, when production of the Model T was in full swing. The reduction in effort per car was on the order of 90 per cent over the old-style craft methods. Not only did that represent a huge advantage over competitors, it also enabled Ford to cut the price of the already highly competitive Model T by an additional two thirds. Not surprisingly, the Model T became the most successful car of its time, selling over 15 million and capturing over 60 per cent of the market in the United States.

Making things in such a way was not problem free: there was still the concern for better utilization of materials, labour, energy and other inputs to production. It led to the concept of scale economies—the principle that with increasing size came increasing efficiency.

By contrast, today's environment is far less easy for manufacture. In recent times, the combination of massively increased competition and more discerning and powerful consumers has shifted the balance strongly to the demand side. For many years, the industry has been moving away from the traditional high-volume/low-variety model to offering different models to serve particular market niches.

Further complications arise because the replacement lives of products are shortening so that the frequency with which new models are introduced increases. Each time a model changes, it potentially requires a new production line with all the associated investment, not only in special-purpose equipment but also in handling and transport equipment, storage facilities, plan layout and, most important, skills development via training. Whereas 20 years ago the life cycle of a car model was around 10 years, the time for new model development is being cut further and further back. In Western firms in the 1980s, it was between five and seven years, while in Japan it was around four years. The average time for most manufacturers now is around 24 months and they are pushing for a 14-month cycle on newer models.

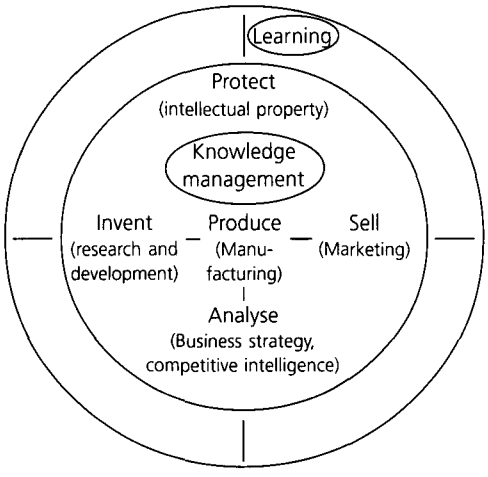
The trouble with technology is that it does not stand still. Apart from the major problems of a changing competitive environment, it needs to be recognized that technology is a moving and accelerating frontier. As a consequence of the huge sums being invested in R&D worldwide, the pattern is essentially one of opportunities seeking application. Examples of whole new fields that are opening up include further applications of communication and information technology, the new world of genetic engineering that has led to cloning and other forms of DNA manipulation, the emergence of new materials and the new field of micro-machine technology.

There is increasing dependence on technology as a source of competitive advantage through its impact on both price factors and non-price factors (design, quality, customization, variety, product innovation, frequency, service, etc.). Markets become more and more demanding. Technology is being used to meet the challenge and to enable manufacturers to exploit strategic advantages through deployment of their technological capabilities. It is essential to find ways of monitoring what is going on and picking up the key signals about technologies that may affect business as early as possible.

B. The innovation process

Innovation is not a linear process. It is characterized by the interaction of numerous factors, functions and elements. It is also not a continuous process. All of that makes management difficult and measurement complicated. It combines physical elements, such as the existing technical infrastructure of a company or a country, with psychological elements, such as the working environment and the reward and punishment system.

Innovation circle



Role of technology transfer

- Role of technology transfer in economic development
- The impact of technology transfer on social patterns of activity, social policies
- The benefits and dangers of technology transfer

Effect for developing countries

- Economic development
- Structural changes in the economy
- Foreign trade
- Domestic technological development

Innovation is a multidisciplinary and multifunctional process. It includes knowledge management as well as management of people (human resource management). Knowledge management is essential to ensure the flow of ideas and perceptions between individuals and groups. It is also needed to optimize the extraction of knowledge from the organization and document it.

The best way to characterize the innovation process is to visualize a circle inside which the various functional aspects of an enterprise interact continuously (see slide 8, entitled "Innovation circle").

C. The role of technology transfer

Technology transfer is the mechanism by which the accumulated knowledge developed by a specific entity is transferred wholly or partially to another one to allow the receiving party to benefit from such knowledge. It allows the receiver to speed up entry into new fields significantly and to reduce costs on already existing products.

When managed appropriately, therefore, technology transfer allows nations or corporations to increase their stock of production and innovative resources, to further the exploitation of local resources and to increase productivity.

It increases the gross national product by opening up new segments, accelerates the growth rate and enhances productivity, provided there is alignment between technology transfer and economic strategies.

Technology transfer can have a significant influence on foreign trade and the balance of payments through multiple substitution effects.

1. The effect on economic development

For developing countries, economic development means the growth of real per capita national income coupled with fundamental changes in the structure of their economies and the important social and political transformation that attends such changes. The dynamics of economic development in any country depend directly on the resources available, their quality and productivity, the extent to which they are used and their growth in both quantitative and qualitative terms.

Technology transfer is one of the means of pursuing technological innovation. Imported technology may directly affect the economic development of the recipient country in three partly interrelated ways:

- Technology transfer may increase the physical stock of productive factors (resources) available.

Role of technology transfer in economic development

- Increase in the physical stock of productive and innovative resources
- Further exploitation of economic resources
  - Natural resources
  - Human resources
  - Innovation
  - Physical resources
- Productivity increase
  - Labour
  - Capital
  - Natural resources
  - Innovation capacity

Such factors include expatriate personnel rendering technical services or holding key managerial posts in local companies, imported machinery and equipment, foreign raw materials, components and parts not available in the host country and accompanying technology transfer contracts.

- Foreign technology may contribute to that increase by exploiting existing resources. It may generate new job opportunities, decrease idle capacity, extend arable land for new crops and may also allow the exploitation of local resources that had been idle owing, for example, to the weakness of indigenous entrepreneurship or its limited technical capabilities.

- Transfer of foreign technology may result in substantial growth in the productivity of existing factors (labour, capital and natural resources, including land) by: *(a)* increasing the volume of outputs while the volume of inputs remains unchanged; or *(b)* decreasing the volume of inputs while the volume of outputs stays the same.

2. Newly industrializing economies

The challenge, however, is to bring about technological change and narrow the gap between the technology importer and the world technology. Foreign technology has been a major contributor to the industrial capabilities of most if not all of the newly industrializing economies (NIEs). Evidence shows that NIE firms have exploited foreign investments, technology and marketing channels to their advantage, gradually assimilating and adapting imported know-how and developing the skills needed to compete internationally. Foreign direct investment, joint ventures, licensing agreements, original equipment manufacturers (OEM) and similar arrangements have been instrumental to industrial success in NIEs. Technology imports were to a large extent used by NIEs as a learning device and as leverage for further innovation.

Technology transfer may play a similar role in enhancing the economic development of developing countries in improving the competitiveness of their firms in international markets if it is used as a learning device and if it interacts effectively with domestic technological efforts.

3. The effects of technology transfer

Technology transfer may have a wide-ranging impact on the countries that receive the technology. Technology imports increase the available stock of technological and managerial knowledge and may help to increase people's welfare and the country's competitiveness. The expected outcome of technology transfer may not always materialize, however.

Since the outcome depends on the interplay of many different factors, including the characteristics of the technology (inputs required, performance implications), the behaviour of the agents involved in the transfer, the profile of the domestic technological system and the efforts devoted to mastering imported technologies, the analysis of the effects of technology transfer demands an appropriate timescale and a systemic approach.

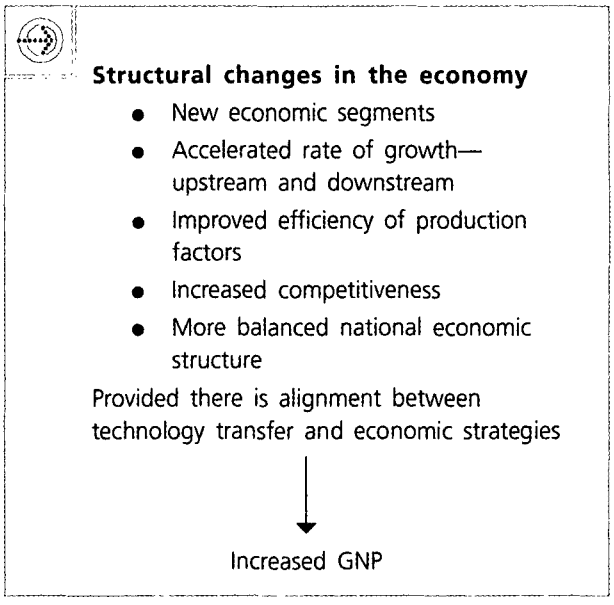
4. Structural changes in the economy

Transferred technology may induce structural changes in the economies of recipient countries in three main ways. Firstly, it may add new segments to the existing economic structure. That is achieved mainly by the launching of new investment projects, which gives the country new industries. Secondly, it may accelerate the rate of growth of some industries, increasing their share of the economy. That happens as a result of new investment projects or the expansion and modernization of existing projects. The superior technical performance and/or product characteristics enabled by imported technologies may strengthen the development of some industries. Thirdly, transferred technology may indirectly influence the conditions of activity in other sectors. It may help to strengthen the domestic industrial fabric and to enhance the capabilities and performance of related and supporting industries, which may be essential for domestic firms to gain competitiveness. Assuming that adequate linkages exist, transferred technology may induce structural adjustments in other industries. Examples would be the manufacturing of dyes for the textile and clothing industries or the production of machinery for the food industry.

All such adjustments may, in the longer run, produce positive outcomes, such as the following:

- Accelerated growth of downstream and upstream industries and, hence, of the country's gross national product
- More efficient exploitation of production factors in the recipient country
- Increased international competitiveness of firms based in the country
- A more balanced structure for the national economy

The key determinant of the nature and extent of structural adjustments induced by imported technology in a developing country and of the ultimate impact on economic development is the degree of cohesion between technology transfer projects and the rest of the economy. The weaker the links between those projects and the national industrial and technological fabric, the more limited the scope of the change described above.



5. Foreign trade

Imports of technology to developing countries may have three types of consequence for foreign trade:

- An import substitution effect
- An import creation effect
- An export creation effect

All such consequences will ultimately be transmitted to the recipient country's balance of payments.

6. Import substitution

Technology transfer may lead to the substitution of domestically manufactured goods and/or services for imports. That happens for two reasons. Firstly, imported technology may allow a reduction of unit production costs and/or increased quality and performance for the domestically manufactured goods,

Technology transfer and foreign trade

- Import substitution effects
- Import creation and import diversion effects
- The export creation effect

Improved balance of payment

Innovation and technological development

- New perspectives of the innovation process
- Technological accumulation by firms
- Role of national systems of innovation

making them more competitive vis-à-vis their foreign equivalents. Secondly, it may allow the domestic manufacture of goods previously available only from abroad. In developing countries, the latter type of import substitution has been the most common. Import substitution could also cause shifts in the physical composition of imports and savings in foreign exchange once used to pay for merchandise purchased abroad.

7. Import creation

Technology transfer can also generate new streams of merchandise imports to the recipient country, thus changing the geographical and physical pattern of imports. The complexity of modern technological processes calls for appropriate productive inputs, some of which are not available in the developing countries and must be imported, for example, high-quality raw materials, spare parts and machinery and equipment.

8. Export creation

Foreign technology usually results in higher quality domestically produced goods (in terms of both type and workmanship) and makes them more competitive in international markets; therefore, it may lead to the establishment of export sectors in the recipient country and in export expansion with new or modernized products.

Technology transfer may also stimulate indirect exports. One example can be found in licensing contracts covering the manufacture of intermediate goods (components, etc.). If included in final products assembled locally, higher-quality intermediate goods substantially increase the export potential of the country.

In the longer run, imported technical knowledge may help to generate technology exports if improvements are made to foreign technology introduced by the recipient firm and if it induces innovative activity. It requires a commitment to mastering imported technologies as well as investments in R&D to improve the technologies concerned and to adapt them to the conditions prevailing in developing countries.

9. Domestic technological development

Technology transfer may be an important means of enhancing the technological level of developing countries, as the experience of Japan and of NIEs clearly shows. In the short term, technology transfer enables the recipient firm (and hence, the recipient country) to increase and modernize its production capacity. In the case of product innovations, new products will be manufactured or the quality of existing ones improved. That allows manufacturing output to be upgraded, with positive consequences for domestic end-users or industrial customers and, eventually, for the firm, as it will be able to compete successfully in international markets. In the case of process innovations, the recipient firm obtains access to new technologies that enable it to manufacture existing goods more efficiently, to upgrade the performance of such goods or, if combined with product innovations, to manufacture new generations of products. Technology transfer arrangements may also convey other elements of the modern manufacturing process, that is, managerial, organizational and marketing knowledge.

To assess the impact of technology transfer on domestic technological development, a longer-lasting approach is needed, since an increase in production capacity does not necessarily raise the technological level of developing countries and firms. Such an approach has to take into account both the importing firm's capability to cope with technical change and the diffusion, within the national industrial fabric, of the technology concerned.

Technology transfer flows may be broken down into three categories. The first includes capital goods and technological services allowing the production capacity of the technology-importing firm to be expanded. That corresponds to the inputs needed to deliver a new plant or to modernize an existing one. Taken in isolation, it does not enable the technology importer to use the facilities efficiently or to generate technical change.

The second category consists of operating and maintenance skills and know-how. It encompasses the various kinds of human-embodied knowledge and skills that the recipient firm needs to operate and maintain the new or changed production system as well as to accumulate operating experience and learn by doing. It is transferred through information codified in manuals, schedules, formulae, and so on and training and instruction, which may help to increase the human capital of the recipient. While the knowledge and skills communicated in such a way cannot, on their own, enable the recipient to master technological change, they constitute a base from which recipient countries and firms can undertake intangible investments to upgrade their technological levels, going beyond skills that are purely operational.

The third category of transfer technology is composed of the knowledge and expertise required for implementing technological change. That corresponds to a deeper level of technological knowledge, since it goes beyond operational and maintenance knowledge to encompass design capabilities. It includes the underlying principles of production processes, product design and material inputs (usually called "know-why") as well as expertise required to apply those principles in designing and implementing technical change, and to organize technological improvement programmes. Its acquisition requires a very committed effort from technology recipients. It implies a good absorptive capacity together with a strong emphasis on learning. It may even be necessary to launch R&D activities within the recipient firm in order to fully master technological principles and to build dynamic capabilities.

However, a technology-importing firm is embedded in a national system of innovation and its ability to master technological change very much depends on the overall level achieved by that system as well as on the efforts being made by its various elements. There must be a policy on innovations that will stimulate cooperation among the different institutions (industrial enterprises, research institutions, the educational system, financial organizations and government agencies) in building up technological, human and organizational resources for assimilating foreign technologies and for generating technological change.

Conditions should be created not only to improve the ability of domestic firms to acquire foreign technologies, but also to promote their diffusion throughout the industrial fabric. Diffusion is essential to fully exploiting the benefits of international technology transfer in developing countries. The faster diffusion occurs and the greater its scale, the stronger its impact.

10. Technology transfer mechanisms

There are many mechanisms for international technology transfer. Each has its merits and shortcomings. A judicious choice has to be made, bearing in mind the characteristics of the technology sought (the more codified it is, the easier it is to rely on "arm's-length" channels), the behaviour of potential suppliers, and the domestic firm's bargaining power and absorptive capacity. If not properly managed, such transfer processes can also produce undesirable side effects, such as balance-of-payment deficits or excessive technological dependence.

The analysis of the historical experience of the NIEs of East Asia shows that different technology transfer

mechanisms were chosen, OEMs were the most important channel for technology acquisition in Hong Kong Special Administrative Region of China, the Republic of Korea and Taiwan Province of China. Foreign direct investments were the most significant mechanism in Singapore.

Historical evidence also shows that the mix of mechanisms used changes over time. As countries and firms move along the learning curve and the technology development path, new alternatives open up, insofar as absorption capability enables improved selection and adaptation.

Special attention should be devoted to the more complex mechanisms for technology transfer to developing countries, such as foreign direct investment. Foreign direct investment can be considered a package of economic assets representing various elements of competitive advantage, including technology, being transferred to the host country. Production technology is only one of many assets, so its impact on the economic development of the recipient country should be evaluated jointly with that of the remaining assets in the economic package.

Intellectual capital model of a corporation

- Historical values
- New studies and initiatives
- Intellectual capital model

Capital valuation era

1800	**Farm**	
1900	**Factory**	
2000	**Intellectual capital (Intellectual assets and people)**	

D. Intellectual capital model

Historically, different elements have been the source of wealth. Up to the 1800s, land ownership was the primary component of fortunes. With the advent of the industrial revolution, factories and other hard and tangible assets were established as the basis for wealth. Since the late 1980s, however, knowledge has supplanted hard assets as the source of enrichment. As a result, traditional reporting (balance sheet and annual reports) has become mostly irrelevant. In 1998, for instance, the average market to book ratio of the Standard and Poor's 500 companies stood at 5.6 (compared with 1 in 1982).

Why the shift? Four major reasons:

- The changing legal environment providing improved protection for knowledge and intellectual property
- The leveraging effect of knowledge and of intellectual capital
- The globalization of legal protection through the World Trade Organization Agreement on Trade-related Aspects of Intellectual Property Rights (TRIPS)
- The effect of the Internet and its instantaneous dissemination of knowledge

1. The legal environment

The establishment of the Court of Appeals of the Federal Circuit brought a momentous change in the United States. Even though the courts of first instance have not changed, the mere existence of that specialized appeals court has notably altered the practical landscape of patents. Studies have shown that since the Court was established, the proportion of challenged patents that were invalidated as a result reversed from roughly two thirds to one third. The practical consequence has been that, for most corporations, patents have shifted from an asset of limited value and high cost to one of strength and potential strategic importance. In a not too distant

past, the chief patent counsel of a large chemical company was instructing his attorneys and researchers not to file for end-use applications of existing compositions of matter, as they were a waste of time and money and would probably not stand in court.

That kind of business philosophy had to change in response to the establishment of the Court of Appeals of the Federal Circuit and, as a result, the number of patents filed and granted in the United States has grown significantly in the past few years.

2. Business

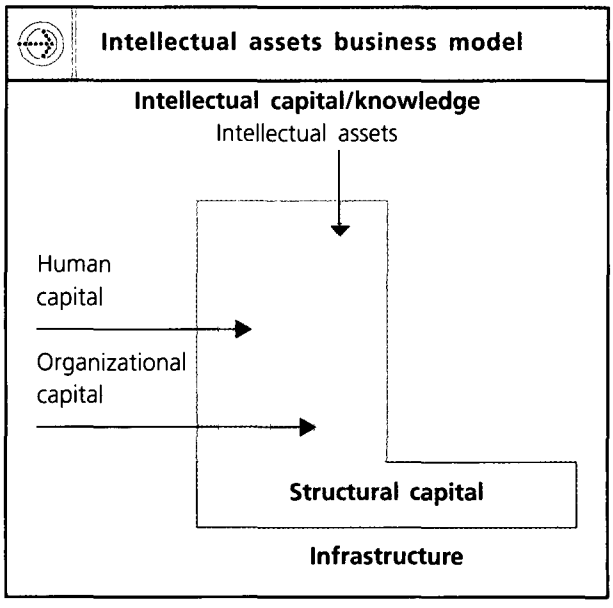
The emergence of information technology (IT) as a separate industry segment has also greatly affected the licensing profession. It can be correlated with the growth and wide dissemination of hardware (computers and electronics) and the development of the Internet.

Firstly, as a service to existing corporations and institutions, IT allowed greater access and transparency of information. Secondly, it created its own set of intellectual assets that were licensed, enforced or traded. Thirdly, it initiated the "dot com" frenzy, with its excessive valuation bubble and subsequent correction.

The thirst of industry, government and institutions for "instantaneously" available data spurred the growth of software and hardware. New marketing tools ("e.markets" for technology), data manipulation and retrieval tools—including patent mapping, citation trees, IP databases—were created for the licensing or technology transfer specialists. That enabled the same "tech" transfer person to increase his or her productivity and led to more internationalization and globalization of the profession.

3. Internationalization

The globalization of industry and the levelling effect of the Internet on the availability of information have led to the parallel growth of licensing world-



wide. Industries in countries where patents were traditionally filed only in their own domestic markets have increasingly boosted their overseas patent portfolio, in particular in Europe and the United States. The Republic of Korea is a typical, but not the only example, of such a trend. The gross analysis of patent filing by different industry sectors in the Republic of Korea shows a near simultaneous growth in the number of patents granted in the United States. Samsung Electronics is the most striking example, but companies such as LG Chemicals follow the same trend.

4. Knowledge management

At the time that corporations realized the growing impact of their IP portfolios, major business restructuring was taking place (mostly in North America and later in Europe), leading to a reduction in the workforce and an important loss of continuity in skill sets. The loss of staff exacerbated an existing need to preserve the knowledge of the corporation that resides in its employees and transform it into a more tangible form. Knowledge management became one of the top priorities in companies.

Simultaneously, world renowned experts in public accounting, such as Baruch Lev from the Stern School of Business, New York University, have been

talking about the lack of relevance of present income statements. Steve Wallman, the former Commissioner of the Securities and Exchange Commission in the United States, has publicly proclaimed the need for corporations to disclose more of their income accounting (IA) strategies in the name of public fairness and corporate health. The result of his efforts led to a thorough report by the Brookings Institution on the subject.[1]

Merrill Lynch has published data showing that the market to book value of the Standard and Poor's 500, which could be considered a fair representation of the industry in the United States at large, went from almost 1/1 in 1978 to 6/1 in 1998. In essence, this means on average that 85 per cent of the value of the largest corporations in the United States is unexplained in traditional annual reports. Such a phenomenon is not limited to the corporations from the United States and Canada.

As a result, a new business model has been emerging where the underlying foundation or infrastructure, referred to as structural capital, represents the hard assets of a corporation. Such assets are well documented and explained in the traditional balance sheet. They are the bricks and mortar; they are depreciable and commodity-like. They are the tangible part of an enterprise and can be used by only one entity at a time.

Overlying structural capital is intellectual capital. Intellectual capital is intangible and unique. It represents the hidden value of a company. Besides its actual value, it also has a latent value if used by others or for other applications. Contrary to structural capital, it can be used simultaneously by many, provided the "knowledge" and the permission to use it has been given. Also, it can appreciate over time.

Intellectual capital is composed of two major elements: human capital and intellectual assets. Human capital focuses on the human factor. It relates to collective and individual experiences, know-how, skills and creativity. It is the main driver for the creation of value. The intellectual asset portion is actually what belongs to an enterprise or a nation. Knowledge management is the discipline that transforms the human capital into intellectual assets. Intellectual assets comprise documents, drawings, processes and systems and inventions. A portion of those assets has specific legal protection—IP. The focus of intellectual assets is on value extraction.

The combination and interaction of all those elements is what makes nations and companies prosperous. A breakdown in any of them and their interrelationships can have disastrous effects, such as reduced profitability, bankruptcy and legal proceedings.

E. Mechanisms of technology protection

There are four main mechanisms of technology protection: trade secrets, patents, copyrights and trademarks.

Some technologies can be protected by all four mechanisms, others only by some of them.

All new technology and innovation start as trade secrets, sometimes also called confidential or proprietary information. From there, the trade secret may remain as such provided the right steps are taken to do so, or it may become public information, protected or not.

1. Trade secrets

The basic elements of a trade secret can be summarized as follows:

- It is information
- It is a secret, but not necessarily an absolute one
- There is an intent to keep the secret

[1]See M. M. Blair, S. M. H. Wallman (Task Force co-chairs), *Unseen Wealth, Report of the Brookings Task Force on Intangibles* (Washington, D.C., Brookings Institution Press, 2001).

Trade secret

Any useful information that is not generally known

Synonyms:

- Proprietary information
- Confidential information

Trade secret characteristics

- Underlying all intellectual property
- Maintaining the secret is essential
- Business and legal risks
- Not retrievable
- Remedies

Patent

Grant from a government to exclude others from making, having made, using, selling or offering to sell in or import into the country or region the invention claimed in the patent.

Patentable subject matter

- Process
- Machine
- Article of manufacture
- Composition of matter
- Method of doing business
- Varies by country/region

- It has an industrial application (in some countries also an application in trade or finance, or a similar field)

- It has economic value

Maintaining the secret is essential, as once made public, intentionally or not, it is impossible to retrieve. Therefore, it is difficult to maintain as confidential any information or knowledge that is shared by a large population. Remedies exist to compensate for the loss of value, but the main competitive advantage to the corporation remains lost.

2. Patents

If a corporation decides to further protect a given technology, it will apply for a patent or a copyright. In such a case, in exchange for making the invention (or part of it) public, the corporation may be granted a monopoly right for a given period of time.

A patent is a grant from a government to exclude others from making, having made, using, selling or offering to sell in or import into their territorial jurisdiction the claimed invention.

To obtain a patent, the disclosure must be novel, useful, non-obvious and enabling. Most countries grant such protection. A number of global and regional treaties and conventions exist either to facilitate the grant of a patent or to enforce it. The Patent Cooperation Treaty, the European Patent Convention and TRIPS are among the most noteworthy.

The protection acknowledged by the patent is limited to 20 years from the original date of filing.

Not every invention may claim patent protection. For an invention to be patentable, it must be new, involve an inventive step, not be obvious and be industrially applicable. These conditions are usually referred to as the substantive conditions of patentability because they concern the essence, the technical content of the technical solution, claimed as an invention in the patent application.

Certain fields of technology are excluded in some countries from patent protection, therefore, an invention that fulfils the substantive conditions must necessarily belong to a field of technology for which patents are acknowledged, that is, that are not excluded from patent protection. Finally, another requirement contained in most patent laws is that the subject matter must not be contrary to public order or morality. For that reason, patents are not available for all inventions, such as:

- Inventions contrary to public health or morality

- Scientific discoveries, scientific theories and mathematical methods

- Processes of treatment of human beings, animals or plants
- Schemes, rules and methods of doing business, performing purely mental acts or playing games (except in the United States)

A patent normally confers upon its owner the right to prevent others from exploiting the invention by manufacturing the patented product, using the patented product, using the patented process or putting on the market products that have been manufactured without the owner's authorization. As long as the owner does not give others such an authorization to exploit, the exploitation of the patented invention is illegal. As far as inventions in the form of products are concerned, most laws tend to acknowledge exclusive rights with regard to three acts, namely:

- To make the product
- To use the product
- To sell the product

In the case of inventions contained in processes, most laws tend to grant protection with respect to the following acts, namely:

- To use the product directly obtained through the process
- To make the product directly obtained through the process
- To sell the product directly obtained through the process

In most countries, there are at least three exceptions to the exclusive rights of the patentees:

- Public interest
- Scientific research
- Prior use manufacture (to a limited extent)

Patent law is governed by the principle of territoriality, that is, a nation can grant industrial property rights only in its own territory. As trade and industry develop more complex international links and transactions, various multilateral agreements were instituted.

The Paris Convention established the Paris Union to protect industrial property at the international level; the Union is composed of the States that are parties to the Convention, which contains a set of basic principles that member States abide by and that are applicable not only to patents but also to utility models, trademarks and industrial designs—the principle of national treatment and the right of priority. The right of priority set forth in the Paris Convention ensures that if an applicant files for industrial property rights in one member State, the same applicant may, within a specified period of time apply for protection in other or all other member States. Such applications will be considered as if they had been filed on the same day as the first one (or earlier) application. They thus enjoy priority with respect to all applications relating to the same invention filed after the date of the first application.

The Patent Cooperation Treaty is essentially an agreement among contracting countries to harmonize patent application filing formalities. Its main objectives are:

- To perfect the legal protection of inventions and to simplify the process of obtaining protection when that is sought in several countries
- To facilitate access to technical information contained in documents describing new inventions
- To contribute to the progress of science and technology, and to facilitate the access of developing countries to the ever increasing volume of modern technology

The European Patent Convention aims at rationalizing the procedure for granting patents in member countries and avoiding duplication of work by national European patent offices. The European Patent Convention established a system of law common to

all members for the granting of patents for inventions, called European patents. Member countries created the European Patent Office (EPO), a supranational institution, and conferred upon it the sovereign right to grant European patents effective in the member countries. Revisions to the treaty are under way, with the goal being a true European patent.

3. Copyrights

Copyrights are used to protect the writings of an author from being copied. They do not protect a technology or innovation per se, just its expression. Copyrights are widely used for protection of computer software, in particular outside the United States. Copyright protection is automatic but can also be registered.

The subject matter of copyright protection includes every production in the literary, scientific and artistic field, whatever the form of expression. However, for a work to enjoy copyright protection, it must be an original creation. The ideas themselves do not need to be new, but the form, be it literary or artistic, in which they are expressed must be an original creation of the author, the result of his or her intellectual labour. The protection is independent of the quality of the work, the value attached to it and even of the purpose for which it is intended.

Almost all national copyright laws grant protection to the following categories of works:

- Literary works (novels, short stories, poems, dramatic works, advertisements, oral works, etc.)
- Musical works (songs, choruses, operas, instrumental works for one, some or many instruments, etc.)
- Artistic works, whether two-dimensional (drawings, paintings, etc.) or three-dimensional (sculptures, architectural works)
- Photographic works (portraits, landscapes, current affairs, etc.)

Copyright

Protects the writings of an author against copying

Copyright subject matter

- Art
- Literature
- Industrial/commercial architecture
- Computer software

Copyright characteristics

- Automatic ownership
- Form of expression only

- Motion picture or cinematographic works (television broadcasting, film dramas, documentaries, etc.)

The owner of copyright in a protected work may use the work in the manner preferred and is entitled to exclude others from using it. The acts requiring authorization of the copyright owner are the right of reproduction; the right of public performance; the right of broadcasting and communication to the public; and translation and adaptation rights.

Copyright protection is limited in time, that is, the law provides for a period of time during which the exclusive rights of the copyright owner exist. The period of protection by copyright normally begins with the creation of the work and extends beyond the life of the author. In most countries, the duration of copyrights protected under national laws is the life of the author and 50 years after death.

Under particular circumstances defined by national copyright law, certain acts normally prohibited by copyright may be done without the authorization of the copyright owner. Such use is generally referred to as fair use:

- Reproduction of a work exclusively for the personal or private use of the person who makes the reproduction

- The making of quotations from a work protected by copyright, provided that the source is mentioned

The aim of the Berne Convention is to protect, in as effective and uniform a manner as possible, the rights of authors in their literary and artistic works. The Convention relies on three basic principles:

- National treatment, according to which works originating in one member State are to be given the same protection in another member State as the latter grants to works of its own nationals

- Automatic protection, according to which such national treatment is not dependent on any formality, that is, protection is granted automatically and is not subject to the formality of registration, deposit or the like

- Independence of protection, according to which enjoyment and exercise of the rights acknowledged is independent of the existence of protection in the country of origin of the work

When the product of an invention or the concept of it becomes well known or may become well known, corporations have also access to trademark protection.

4. Trademarks

Trademarks are used to indicate the origin of goods or services and to distinguish them from others. Some trademarks are registered. Some are not.

A trademark is a sign that is used or intended to be used by a manufacturer, producer or trader to distinguish his or her products or services from those of other producers, manufacturers or enterprises. Because a trademark's function is to distinguish, only distinctive signs may be trademarks. The main purpose of protecting trademarks is to ensure that only distinctive signs are used and to prevent confusion among trademarks. If products or services are different in nature or serve different purposes, they are already distinguished by their nature or purpose.

Trademark

Word, name, symbol or device used in trade to indicate the origin of goods or services and to distinguish them from the goods or services of others

Trademark types

- Trademark (registered or not)
- Service mark
- Trade name
- Collective mark
- Certification mark

Trademark characteristics

- Distinctiveness
- Dilution
- Treaties
- Confusion

The secondary purpose of a trademark is to identify a particular enterprise offering specific products or services in a market. Trademarks do not distinguish products or services as such. They distinguish the relationship of products and services to a particular enterprise, the enterprise from which they originated. That implies that trademarks distinguish one source of identical or similar products or services from enterprises offering similar products or services.

There are two types of mark: trademarks and service marks.

A trademark is a sign that serves to distinguish the products of one enterprise or producer from the products or services of other enterprises or producers. "Product" refers to any item that is sold and, therefore, needs to be distinguished, in order to allow customers to make their choice. "Services" comprise a wide range of activities, such as financing, messengers, couriers, education, communications and transportation.

A collective mark usually belongs to a group or association of enterprises; its use is reserved for

the members of the group or association. Collective marks serve to distinguish characteristic features of the products offered by those enterprises, for example, compliance with certain quality standards.

Legislation in some countries provides for certification marks, which have the same purpose as collective marks. However, their use is not confined to the members of a particular group or association of enterprises. Instead, they may be used by any entity that fulfils certain conditions.

Exclusive rights in a mark are acquired by registering the mark in the country's register of marks. Mark registration does not automatically last indefinitely. Registration is limited in time: frequently the duration provided by national laws is 10 years. The registered owner of a mark may renew its registration for indeterminate additional 10-year periods by paying a renewal fee.

The scope of protection varies depending on whether a trademark has been registered or is protected on the basis of its use.

Typically, trademark registration provides protection only in the country of registration. To obtain protection in other countries, the trademark needs to be registered there. A trader or manufacturer wishing to protect a trademark in several countries must comply with the trademark registration formalities of the national office of each individual country. That means that: *(a)* the trader or producer must submit the trademark to different procedures; *(b)* it will have to file an application in different languages; *(c)* the trademark will be subject to varying terms of protection, resulting in differing renewal dates; *(d)* the trader or producer will have to appoint a local agent; and *(e)* the producer will have to pay different fees in each country (registration fees, agents' fees, etc.).

Under the Madrid Agreement, it is possible to file an international registration having effect in the countries party to the Agreement. Thus, an applicant needs to comply with only one set of formalities within the International Bureau of the World Intellectual Property Organization. A trademark thus covered by international registration enjoys the same protection it would have enjoyed had it been filed directly in those countries.

TECHNOLOGY TRANSFER OPERATIONS
TECHNOLOGY AND INNOVATION

- **Importance of technology**
- **Innovation process**
- **Role of technology transfer**
- **Intellectual capital model**
- **Mechanisms of technology protection**

TECHNOLOGY TRANSFER OPERATIONS
TECHNOLOGY AND INNOVATION

Importance of technology

- Competitiveness of business
- Economic growth of nations
- International trade

Technology and development

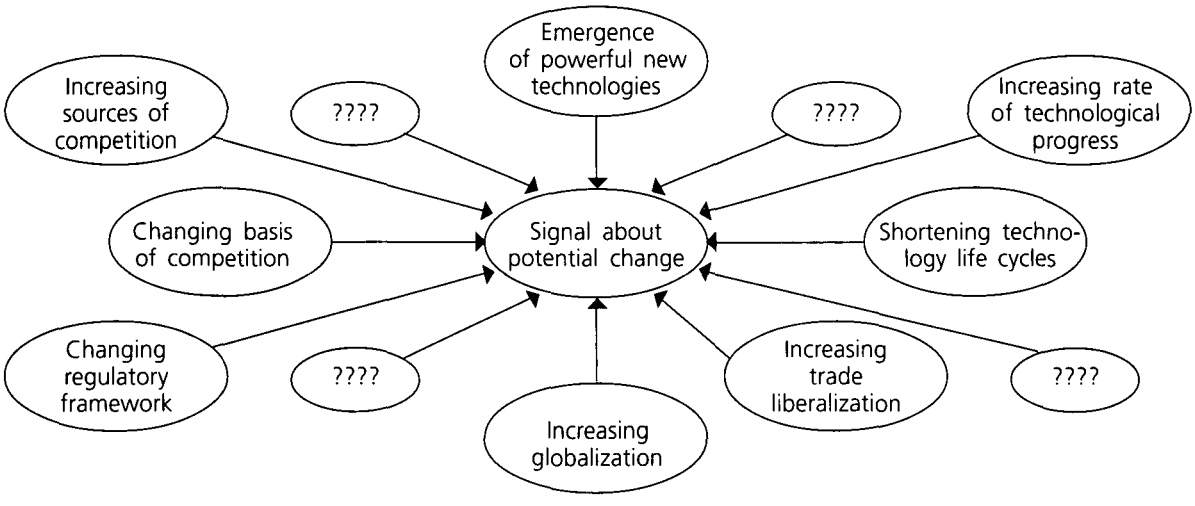
- Technology and competitiveness
- Technology and economic and social development

Innovation and technological development

TECHNOLOGY TRANSFER OPERATIONS
TECHNOLOGY AND INNOVATION

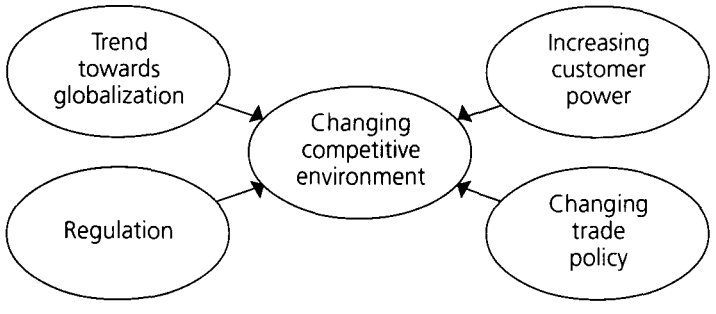
Understanding the challenge

- Technology and competitiveness
- Technology and economic and social development
- Innovation and technological development



TECHNOLOGY TRANSFER OPERATIONS
TECHNOLOGY AND INNOVATION

The changing competitive environment



TECHNOLOGY TRANSFER OPERATIONS
TECHNOLOGY AND INNOVATION

The changing base of competition

Examples of changes include:

- More variety
- More customization
- More frequent model change
- High quality
- Faster delivery
- Better service
- Advanced design

TECHNOLOGY TRANSFER OPERATIONS
TECHNOLOGY AND INNOVATION

The trouble with technology

Key trends:

- Emergence of major new fields
- Integration and blurred boundaries
- New organizational concepts
- Increasing rates of change
- Increasing linkages and alliances

BUT

Technology is a key source of competitive advantage

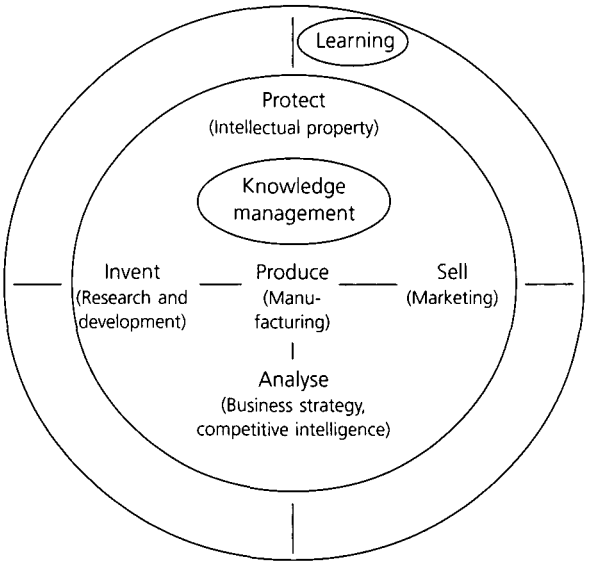
TECHNOLOGY TRANSFER OPERATIONS
TECHNOLOGY AND INNOVATION

Innovation process

- Interactive and holistic process
- Linkage with internal function
- Linkage with outside world
- Knowledge management
- Human resource management
- Learning circle

TECHNOLOGY TRANSFER OPERATIONS
TECHNOLOGY AND INNOVATION

Innovation circle



TECHNOLOGY TRANSFER OPERATIONS
TECHNOLOGY AND INNOVATION

Role of technology transfer

- Role of technology transfer in economic development
- The impact of technology transfer on social patterns of activity, social policies
- The benefits and dangers of technology transfer

Effect for developing countries

- Economic development
- Structural changes in the economy
- Foreign trade
- Domestic technological development

TECHNOLOGY TRANSFER OPERATIONS
TECHNOLOGY AND INNOVATION

Role of technology transfer in economic development

- Increase in the physical stock of productive and innovative resources
- Further exploitation of economic resources
  - Natural resources
  - Human resources
  - Innovation
  - Physical resources
- Productivity increase
  - Labour
  - Capital
  - Natural resources
  - Innovation capacity

TECHNOLOGY TRANSFER OPERATIONS
TECHNOLOGY AND INNOVATION

Structural changes in the economy

- New economic segments
- Accelerated rate of growth—upstream and downstream
- Improved efficiency of production factors
- Increased competitiveness
- More balanced national economic structure

Provided there is alignment between technology transfer and economic strategies

↓

Increased GNP

TECHNOLOGY TRANSFER OPERATIONS
TECHNOLOGY AND INNOVATION

Technology transfer and foreign trade

- Import substitution effects
- Import creation and import diversion effects
- The export creation effect

↓

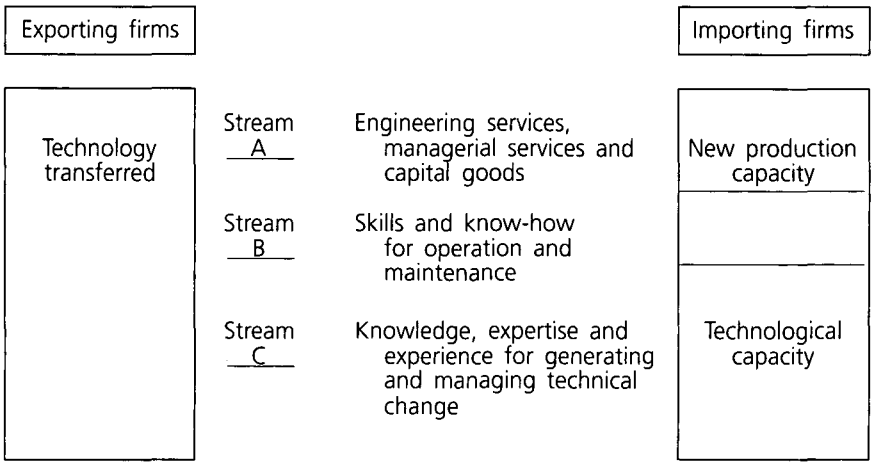
Improved balance of payment

Innovation and technological development

- New perspectives of the innovation process
- Technological accumulation by firms
- Role of national systems of innovation

TECHNOLOGY TRANSFER OPERATIONS
TECHNOLOGY AND INNOVATION

Technological content of technology transfer agreements



TECHNOLOGY TRANSFER OPERATIONS
TECHNOLOGY AND INNOVATION

Dependence on imported technologies

Dependence diminished by:

- Making more appropriate technological choices
- Exploiting imported technologies more effectively
- Adapting and improving imported technology
- Overcoming hidden costs—better contracts

TECHNOLOGY TRANSFER OPERATIONS
TECHNOLOGY AND INNOVATION

National systems of innovation: components

- Information systems
- Scientific and technological (research centres, etc.)
- Education and training (educational institutions, etc.)
- Financial (e.g. banks, venture capital)
- Administrative (public institutions)
- National technology strategy

TECHNOLOGY TRANSFER OPERATIONS
TECHNOLOGY AND INNOVATION

Technology transfer mechanisms and market entry by firms in newly industrializing countries

- Joint ventures
- Licensing
- Imitation
- Subcontracting
- Foreign buyers
- Original equipment manufacturers
- Informal means
- Company acquisitions
- Strategic partnerships

TECHNOLOGY TRANSFER OPERATIONS
TECHNOLOGY AND INNOVATION

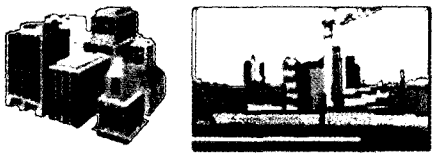
Intellectual capital model of a corporation

- Historical values
- New studies and initiatives
- Intellectual capital model

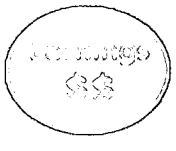
Capital valuation era

1800 **Farm**

1900 **Factory**



2000 **Intellectual capital (Intellectual assets and people)**



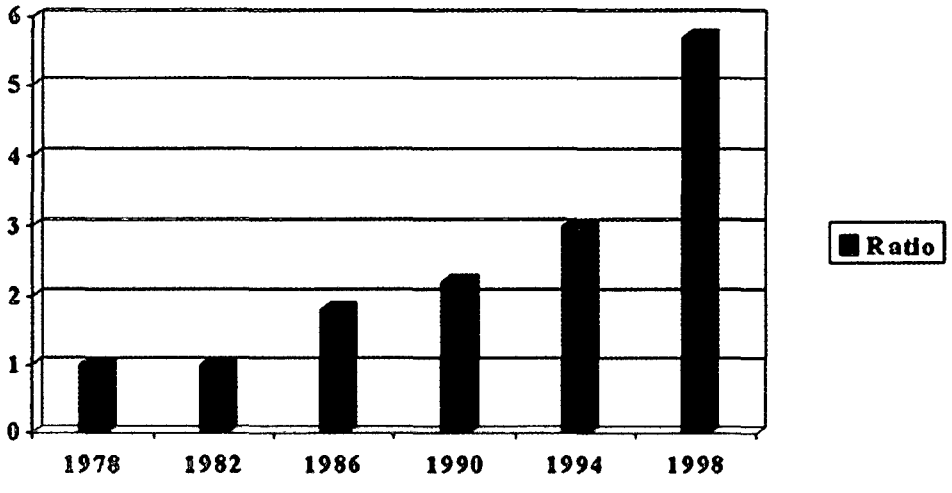
TECHNOLOGY TRANSFER OPERATIONS
TECHNOLOGY AND INNOVATION

Why the shift towards intellectual capital?

- Effects of the Internet and new technology
- The leveraging effect of intellectual capital
- The changing legal environment
- Impact of Trade-related Aspects of Intellectual Property Rights

TECHNOLOGY TRANSFER OPERATIONS
TECHNOLOGY AND INNOVATION

The average market to book ratio of the Standard and Poor's 500 companies



Source: Merrill Lynch.

TECHNOLOGY TRANSFER OPERATIONS
TECHNOLOGY AND INNOVATION

New studies and initiatives

- Brookings study on valuing intangibles
- Symposium on measuring intangibles
- European initiatives
- Committee on Intellectual Asset Reporting Standards of the Licensing Executives Society International
- Political, managerial and legal implications

TECHNOLOGY TRANSFER OPERATIONS
TECHNOLOGY AND INNOVATION

The business perspective of intellectual assets

Intellectual assets business model

Structural capital

Infrastructure

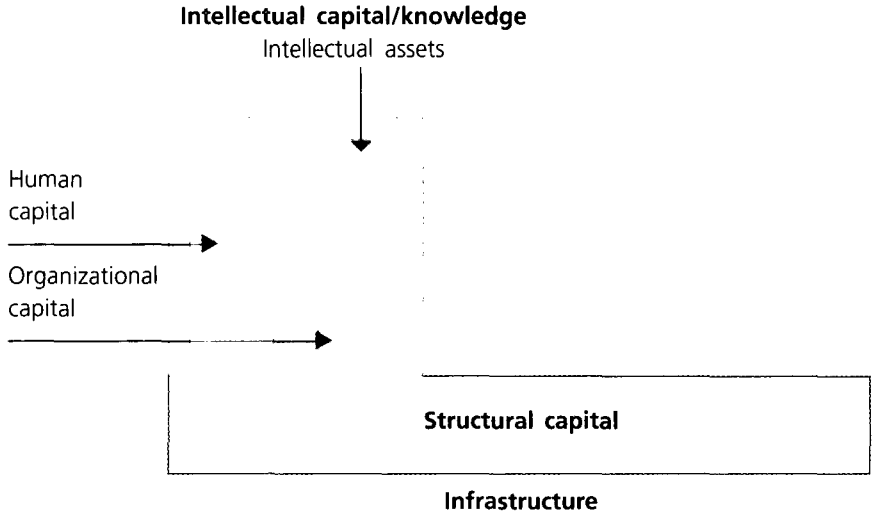
TECHNOLOGY TRANSFER OPERATIONS
TECHNOLOGY AND INNOVATION

Structural capital

- Balance sheet assets
- Bricks and mortar: plant and equipment
- Depreciable
- Commodity-like
- Tangible

TECHNOLOGY TRANSFER OPERATIONS
TECHNOLOGY AND INNOVATION

Intellectual assets business model



TECHNOLOGY TRANSFER OPERATIONS
TECHNOLOGY AND INNOVATION

Intellectual capital

- Intangible
- Appreciable
- Unique
- Best differentiated
- Hidden value
- Latent value

TECHNOLOGY TRANSFER OPERATIONS
TECHNOLOGY AND INNOVATION

Intellectual capital

Human resources

Experience

Know-how

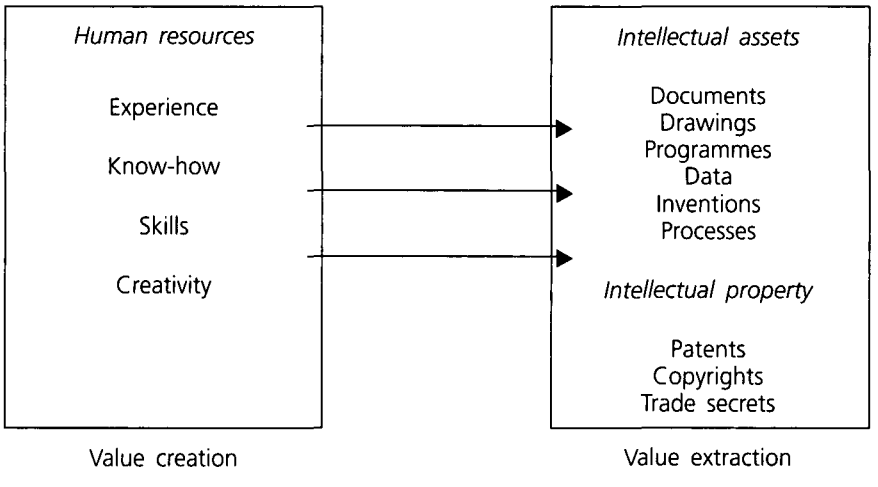
Skills

Creativity

Value creation

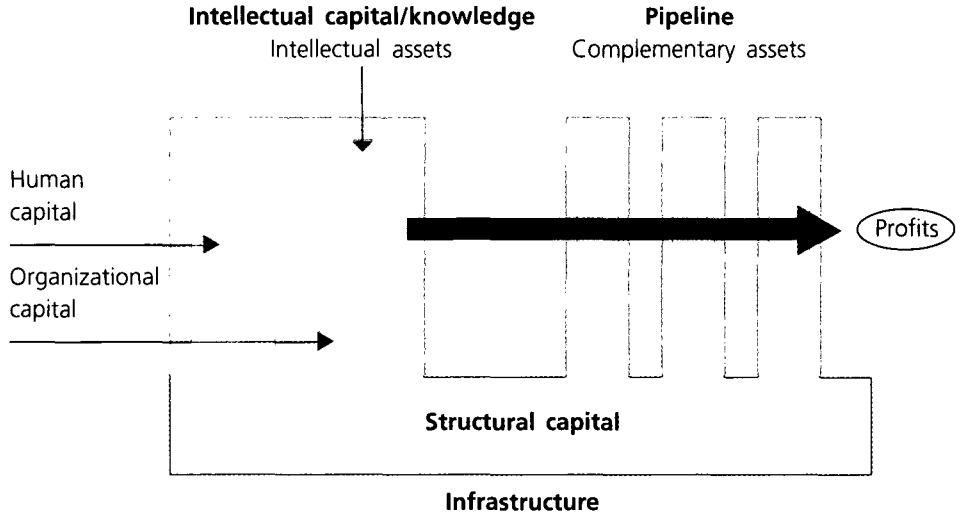
TECHNOLOGY TRANSFER OPERATIONS
TECHNOLOGY AND INNOVATION

Intellectual capital



TECHNOLOGY TRANSFER OPERATIONS
TECHNOLOGY AND INNOVATION

Intellectual assets business model



TECHNOLOGY TRANSFER OPERATIONS
TECHNOLOGY AND INNOVATION

Mechanisms of protection of technology

- Types of intellectual asset
- Trade secrets
- Patents
- Copyrights
- Trademarks
- Overview

TECHNOLOGY TRANSFER OPERATIONS
TECHNOLOGY AND INNOVATION

Types of intellectual asset

Objectives:

- Define and explain basic intellectual property vocabulary and concepts
- Explain major components of a patent

Forms of common property

Tangible

Real and personal

Intangible

Intellectual

Forms of intellectual property

- Trade secret
- Patent
- Trademark
- Copyright

TECHNOLOGY TRANSFER OPERATIONS
TECHNOLOGY AND INNOVATION

Trade secret

Any useful information that is not generally known

Synonyms:

- Proprietary information
- Confidential information

Trade secret characteristics

- Underlying all intellectual property
- Maintaining the secret is essential
- Business and legal risks
- Not retrievable
- Remedies

Patent

Grant from a government to exclude others from making, having made, using, selling or offering to sell in or import into the country or region the invention claimed in the patent.

Patentable subject matter

- Process
- Machine
- Article of manufacture
- Composition of matter
- Method of doing business
- Varies by country/region

TECHNOLOGY TRANSFER OPERATIONS
TECHNOLOGY AND INNOVATION

Patent characteristics

- Novel (statutory bars)
- Useful
- Non-obvious
- Enabling

Legal and international issues

- Government jurisdiction
- Infringement litigation
- Validity
- Date of invention
- Treaties and conventions

TECHNOLOGY TRANSFER OPERATIONS
TECHNOLOGY AND INNOVATION

Utility model

- Patent procedural treaties
  - Patent Cooperation Treaty
  - European Patent Office and the European patent
  - Others
- Intellectual property protection and commerce treaties
  - Trade-related Aspects of Intellectual Property Rights and the World Trade Organization
  - Anti-trust and anti-competitive remedies laws

TECHNOLOGY TRANSFER OPERATIONS
TECHNOLOGY AND INNOVATION

Copyright

Protects the writings of an author against copying

Copyright subject matter

- Art
- Literature
- Industrial/commercial architecture
- Computer software

Copyright characteristics

- Automatic ownership
- Form of expression only

TECHNOLOGY TRANSFER OPERATIONS
TECHNOLOGY AND INNOVATION

Trademark

Word, name, symbol or device used in trade to indicate the origin of goods or services and to distinguish them from the goods or services of others

Trademark types

- Trademark (registered or not)
- Service mark
- Trade name
- Collective mark
- Certification mark

Trademark characteristics

- Distinctiveness
- Dilution
- Treaties
- Confusion

TECHNOLOGY TRANSFER OPERATIONS
TECHNOLOGY AND INNOVATION

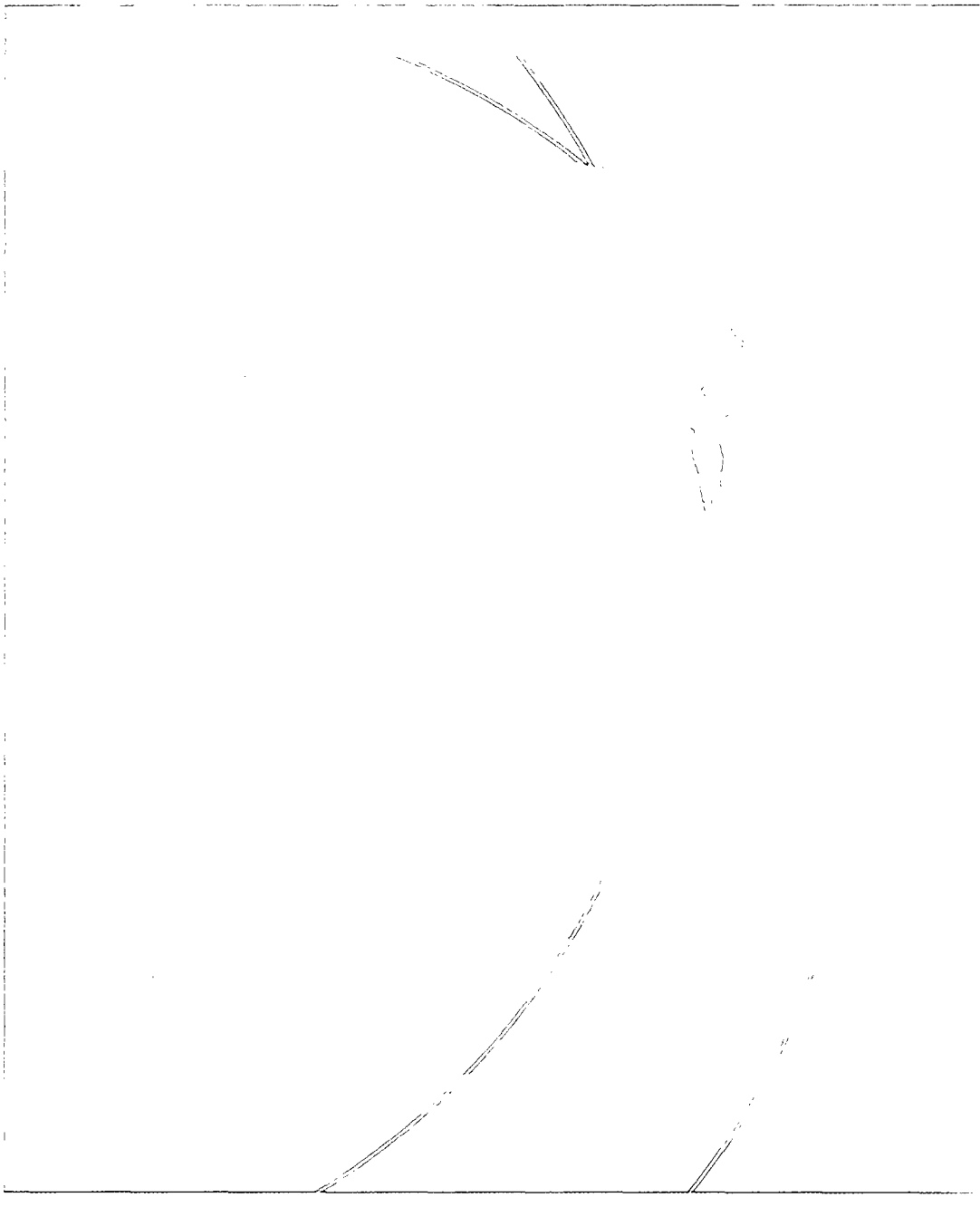
Overview of types of intellectual asset

	Trade secret	Patent	Copyright	Trademark
Protects	Technical or business data that are secret and give an advantage to owner	Idea claimed	Work itself, not idea behind it	Words, phrases, logos, visual appearance
How to protect	Keep secret	Apply for patent	Automatic or registered	Actual use and apply for registration
Who applies for protection		Inventor	Author	User or licensor of user
Term of protection	Till secret	20 years from filing	Life of author +50-100 years	Unlimited duration until abandoned, varies by jurisdiction
Protection provided	Penalties for unlawful use	Excludes use by others without permission	Prevents unauthorized copying/use	Right to exclude others whose use may cause confusion or mistake

Exercise

Recognizing IP

II. TECHNOLOGY ACQUISITION



II. TECHNOLOGY ACQUISITION

A. Mechanisms of technology management

Mechanisms of technology management

Aspects of technology management

- Value creation mode
- Value extraction mechanisms

Value creation focus on the human capital

- Innovation
- Process culture
- Customer relations
- Organizational culture
- Knowledge management

Modern thinking considers two distinct aspects of technology management, the value creation mode and the value extraction mechanisms.

Value creation is centred for the most part on innovation processes and the underlying aspects of an enterprise. The focus is on the human side—human capital. Human capital is the capital that can literally walk out of the office or leave the nation. It is, therefore, critical to establish processes, known as knowledge management, to transfer the ideas, the knowledge and the creativity of the human factor into a more tangible form, such as intellectual assets. Intellectual assets belong to a corporation or a State. Human capital does not.

Intellectual assets are at the core of the value extraction mechanisms. Besides intellectual assets, value extraction mechanisms include elements such as decision and management processes (e.g. strategic planning or competitive analysis) and "practised" processes. The emphasis is on practised rather than published. It will also include organizational capability, in particular in newly established organizations or developing countries.

Only a finite number of mechanisms are available to extract value from intellectual assets: outright sale, donation to non-profit organizations (only in the United States), straightforward licensing, entering into a joint venture or alliance, preventing competition from using the technology and using it in an existing business or a new one.

The business of intellectual assets needs to be seen from the same perspective as traditional business is seen. Similar thinking should be applied. The key principle to remember is that for each product or service created (tangible part), an equivalent intellectual asset is created (intangible part).

Equivalent steps are present for both, from conception to final commercialization.

Core competences

Definition: "The specific technologies that will allow a corporation to sustain a competitive advantage over time."

(C. K. Prahalad)

Characteristics of core competences

- Need to be defined narrowly
- Need to be manageable
- True differentiation from others
- Few and distinct
- Needed for survival of corporation
- Need constant nurturing and renewal

B. Core competences

C. K. Prahalad defines core technologies as those specific technologies that will allow a corporation to sustain a competitive advantage over time. It is critical for a corporation to define its core technologies correctly, to define them narrowly enough to differentiate itself from its competitors and to be able to manage its technologies effectively.

True core competences are few and narrowly defined. They need constant nurturing and renewal for the corporation to survive and strive. The management of core competences should at least include the functions of research and development (R&D), personnel, business (strategy) and intellectual property protection. It will emphasize strengths and weaknesses as well as gaps and potential threats. It is essential to first determine the core competences of a corporation (or of a nation) before any other technology management is considered.

Internal technology sources

Advantages

- Company technological growth
- Exclusivity/competitive advantage

Disadvantages

- Takes longer
- May lack capability
- Higher risk of failure

Costs could be high or low, depending on the situation

C. The selection process

The selection process

Acquiring the technology to support the strategic plan

- Internal sources
  - Tacit knowledge
  - Internal research and development
- External sources
  - Purchasing
  - Licensing
- Combination of internal and external
  - Reverse engineering
  - Strategic partnership

The selection of technology to be acquired will depend on a combination of internal and external factors and will include an assessment of the advantages and disadvantages of moving forward.

The selection process will first look at the gaps to accomplish the strategic plan. It will also take into account the availability of internal sources before looking at external availability. Sometimes a combination of the two will be needed to succeed.

1. Internal technology

Internal technology acquisition is the result of technology development efforts that are initiated and controlled by the company itself. Internal acquisition requires the existence of a technological capability in the company. It also includes the process of seizing tacit knowledge (understanding and codifying knowledge that already exists inside the company, but that is not well enough understood or widely used).

Internal technology acquisition options have the advantage that any development becomes the exclusive property of the company. In addition, the resulting technology will be tailored to meet the company's needs. However, internal development also has risks. The development of technology generally takes longer than acquiring and adapting already developed technology from external sources. Internally developed technologies generally cost more than those acquired externally.

2. External technology

External technology acquisition is the process of acquiring technology developed by others for use in the company. External technology acquisition generally has the advantage of reduced cost and time to implement, and lower risks. However, almost all technology available from external sources was originally developed for different applications, therefore, external acquisition usually must contain an aspect of adaptation to the acquiring company's application. The acquiring company must realize that that adds costs, time and risks to the project.

External technology sources

Advantages

- Reduced time to market
- Reduced risk
- Address internal capability

Disadvantages

- Low technological growth
- Give up exclusivity advantage
- Have to adapt the technology

Costs generally lower, but be sure to consider the cost of implementation

External acquisition can take the form of licensing, purchasing equipment with embedded technology, investment in a joint venture that has a technology development purpose or even the acquisition of a company that has the desired technology.

Many forms of technology acquisition are a combination of external and internal activities. Combination options include the addition of networking to internal activities, reverse engineering (where internal people decipher developments accomplished by others), contracting others to conduct R&D for you and forming a partnership based on R&D where portions of the technology development are shared with others (see below).

Forms of technology acquisition, indicating a continuum of internal and external activities

	Purely internal						*Purely external*
Seizing tacit knowledge	x						
Internal R&D	x						
Internal R&D with networking		x					
Reverse engineering		x					
Technology transfer and absorption			x				
Contract R&D				x			
R&D strategic partnership					x		
Licensing						x	
Purchasing						x	
Joint venture							x
Acquisition of company with technology							x

3. Choosing the best source

The following elements should be considered in order to choose the best source:

- Company technological growth
- Exclusivity/competitive advantage
- Company capability
- Time to market
- Risk of failure
- Cost and affordability
- Making a decision
- Seizing tacit knowledge
- Internal R&D
- Internal R&D with networking
- Reverse engineering
- Technology transfer and absorption
- Contract R&D
- Strategic R&D partnerships

- Licensing
- Purchasing
- Joint venture with a technology provider
- Acquisition of a company with the technology

Company technological growth. The company's need for technological growth must be an important consideration when deciding among technology acquisition options. Ideally, the company should grow technically from every technological acquisition. That is desirable because if the technology acquisition develops internal capability, the company becomes less dependent on others. It is able to deal with problems that arise after the introduction of the new technology and it is able to develop its own enhancements of that technology. That makes it better able to service its own customers in a timely and responsive manner and to increase its potential to develop exclusive products or processes that will give it a competitive advantage in the marketplace.

Exclusivity/competitive advantage. Many companies rely on a technological advantage to differentiate their product from their competitors. They must use internal technology development by their own R&D or contract R&D from another supplier to maintain their competitive advantage. Technology acquisitions that do not give them exclusive access in their own market to the technology make it impossible to prevent their competitors from having the same technology in their products. In order to be fully able to maintain a competitive advantage, the acquiring company must develop internal capability so that it can maintain the technological leadership in its market that the external technology acquisition first provided.

Company capability. A company without internal technical capabilities cannot conduct internal technological acquisition. Companies with internal technological capabilities have a greater number of options than those which do not. Companies must make their acquisition decisions with a full understanding of their internal capabilities (or lack of them). A company should not overestimate its internal capability.

Time to market. The length of time from the acquisition of technology until the company begins to recover revenue from its investment (via the sale of products or a service resulting from new technology) is a key factor in the acquisition decision. Internal acquisition takes longer than acquiring already developed technology from external sources.

Time must be allowed for the acquisition process, equipment set-up, modification to meet local raw material requirements, staff training and the necessary changes to the company's promotional material. However, the opportunity cost of taking the time to develop the company's own solution may be such that acquiring existing technology is the best choice.

Risk of failure. The risks of technological failure are greatest with internal and contract R&D. Purchasing proven technology greatly reduces the risk of technological failure but does not eliminate it. The company still has to adapt the acquired technology to its application, which may have characteristics that are quite different from those where the technology was first successful.

Cost and affordability. The cost of each technology acquisition option is an important issue to consider. In the case of external acquisition, the initial cost and royalty costs are generally quite clear and relatively easy to compare with the benefits. However, it is easy to overlook the cost of installation, adaptation and training in the area where the new technology is to be introduced, not to mention the costs associated with the impact that the new technology has on the rest of the organization. The difficulty in estimating the total cost increases with internal acquisition owing to the increased number of unknowns involved.

Choosing the best technology source for your company

Considerations	*Internal technology source*	*Combination of internal and external*	*External technology source*
Company technological growth	Highest potential	Medium potential	Lowest potential—must address ways to grow technically
Exclusivity/competitive	Highest potential	May maintain exclusivity	Limited exclusivity
Advantage	Unique product or process	May have to share with partners	May negotiate for a specified market
Company capability	Must be relatively strong technically	Technical strength is required, but it can be weaker	Technical strength is an asset but not essential
Time to market	Generally longest	Can be reduced thanks to added information	Shortest
Risk of failure	Highest	Medium risk	Lowest
Cost and affordability	Highest cost	Usually medium costs	Lowest

Making a decision. The table above summarizes the information provided and provides some general guidelines to help guide initial thinking.

Seizing tacit knowledge. Companies should make a conscious effort to document the tacit knowledge of their employees. Thorough documentation will convert the tacit knowledge to codified knowledge, making it readily transferable. Since tacit knowledge is the result of experience, it is by definition constantly changing.

Documenting tacit knowledge will allow it to spread throughout the organization, resulting in innovations and productivity gains in other parts of the company. It will make the company less vulnerable to having key pieces of tacit knowledge contained in one of a few people and it will motivate employees to innovate.

Internal R&D. Technology acquisition via internal R&D consists of having an R&D group within the company that creates the technology which the company uses. The size of the group relative to the size of the company is dependent on the degree of sophistication of the industry that the company serves, and on the attitude of management towards the value of technology and technology development.

Many small companies have grown from the development of a new product idea by the company founder.

In-house development is often more expensive than acquiring technology externally. Risk of failure is another disadvantage that must be addressed when considering internal R&D.

Internal R&D with networking. Internal R&D with networking has all the same advantages and disadvantages discussed under the previous point, Internal R&D. The main difference is that the R&D staff make a concerted effort to keep up to date on the state of development of the technologies affecting their products. That adds some initial costs to operating an internal R&D group, but provides the staff with exposure to other ideas. It keeps them from reinventing the wheel. It reduces the risk of failure because the staff are working with a better knowledge base. For the same reason, it reduces the time to market, which more than makes up for the added costs for networking activities.

Reverse engineering. Reverse engineering is the determination of the technology embedded in a product through rigorous study of the attributes of competitive products. It entails disassembling the product and subjecting its components to a series of tests

and engineering analysis to ascertain how it works as well as the engineering design criteria used in the product's creation. Reverse engineering is perfectly legal as long as IP rights do not prevent its use by competitors.

Technology transfer and absorption. Technology transfer and absorption is similar to internal R&D with networking. The difference is that there is much more effort put into searching for, learning about and translating existing technologies to the company's applications. Internal technical capability is required to understand the technologies found and to develop them into solutions for the company's applications.

Contract R&D. Companies choose to contract out R&D for a variety of reasons. It is an ideal option for those which lack the necessary facilities and expertise to conduct the required work but still want to maintain control over the development and own the results exclusively. It is also a good choice for those which need a specialized set of equipment or expertise for occasional short-term projects. It avoids the investment in those facilities and the ongoing commitment to staff who would normally be underutilized. It allows short-term access to world-class personnel and facilities for specialized projects that would otherwise be completely beyond the company's means.

Although contract R&D offers the benefit of acquiring external technology without sharing ownership, it is more difficult to keep the work confidential. Care must be taken to ensure that the contracting organization meets the company's confidentiality standards.

Strategic R&D partnerships. Strategic R&D partnerships have much in common with contracting R&D. They generally consist of a group of companies with a common need that collectively contract a research institution to conduct the work for them. It allows the companies to share the risk and cost. It also creates a situation where they can learn from each other as well as from the experts conducting the research. Basic R&D into new fields is often conducted in such a way.

Licensing. The licensing of existing technology is an effective form of technology acquisition. It enables companies to skip the technology development phase of technology acquisition and move directly into implementation. Its major benefit is a significant reduction in time to market relative to forms of technology acquisition that require development. It also enables the acquiring company to share the financial risks of acquiring the technology with the provider because the bulk of the payments are generally in the form of a royalty—a percentage of the sales of a product made using the technology.

Technological risks are almost eliminated because the technology has been proved to work in the application being considered. However, there are still implementation risks to be addressed.

Purchasing. A common and effective external technology acquisition method is purchasing technology. Buying production machinery with embedded technology does that. It is low-risk because the equipment has been proved to work technically and evidence can be acquired from other users to back up the providing company's claims. In addition, the providing company can also provide implementation support in the form of set-up and training.

Joint venture with a technology provider. Entering into a joint venture agreement with a technology provider is another form of external acquisition that can be very effective. Typically, it is a partnership between a company with a technology and a company with market access. It can take the form of the creation of a new company with each of the partners owning shares in the new company in proportion to the value of their contribution to the new company.

Acquisition of a company with the technology. The final form is the acquisition of a company that has the technology desired by the acquiring company. That can happen when one company has a technological innovation that has an impact on another company's business. Rather than trying to duplicate or improve upon the first company's innovation—which would take time and might not have the desired results—the second company negotiates to purchase the entire company.

It is critical to first investigate the internal R&D option and then, based on a clear assessment of the external environment, to decide which of the available options to pursue. Each of the various technology acquisition options described above has its own rate of success, advantages and disadvantages, and level of complexity and difficulty, depending on the particular situation and the desired outcomes.

D. Barriers and determinants

There are numerous barriers to and determinants of a successful technology transfer. Some are of an internal nature, such as the need of the user and its R&D capability. Others are external, such as market conditions, industry concentration and geographical concentration of competition. Each of those factors has to be evaluated and measured before, during and after the technology acquisition process.

It is necessary at the present stage to develop a well defined process to move forward, such as the stage-gate process. Such a process should include:

- A system to understand the costs and risks as well as the associated benefits
- A clear understanding of the application or intended application of the technology being acquired
- Several gates with "Go"/"No go" decisions associated with a re-evaluation of the risk benefit ratio

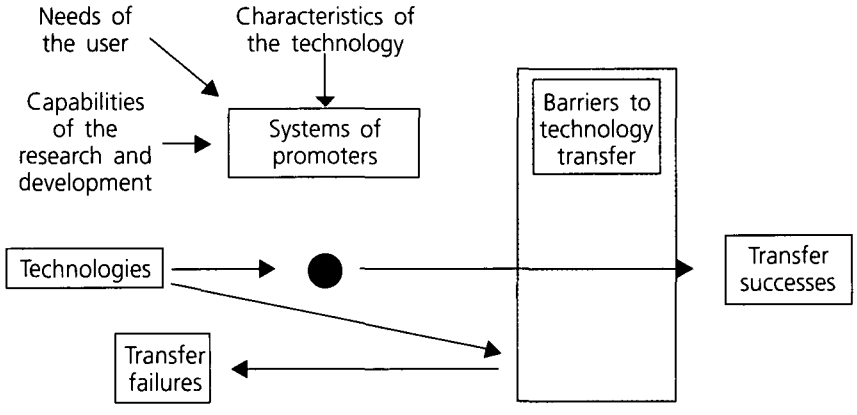
1. Exterior barriers and determinants

Besides barriers to successful technology sourcing relating to the acquirer, a number of other exterior factors have an impact upon it.

Barriers and determinants—exterior

- Geographical concentration
- Industry and company concentration
- Technology and research and development correlation
- Technology trade versus foreign direct investment
- Technology trade and markets for other services
- Sophistication level of licensed technology

Barriers to technology transfer



2. Geographical concentration

The most striking property of the world technology trade is its extremely high degree of concentration. The overwhelming majority of licence exports come from developed market economies. The share of developing countries and centrally planned economies is minimal. Consequently, most of the technology sold to developing countries comes from developed countries.

3. Company and industry sector concentration

The world trade in licences is highly concentrated not only at the country level but also at the company and sectoral levels. The bulk of technologies in the world, up to between 80 and 90 per cent, are disseminated through multinational companies (MNCs). The share of internal transactions in the total world licence turnover has also grown continuously with the establishment of subsidiaries.

4. Technology trade versus technical position

The technology transfer market is strongly related to innovative R&D activity. The position of countries in the international technology transfer market is positively correlated with their innovative potential; the extent of their technology utilization; and the productivity of their R&D as measured, for instance, by the number of patents granted at home and abroad for local inventions.

5. Technology trade and markets for other services

Trading in licences has also displayed a close relationship with markets for investment goods and highly skilled labour. It derives from the fact that technology acquisition, as a rule, constitutes one element in a larger contract (e.g. a turnkey plant) or includes a flow of machinery and/or equipment. The start-up of licensed production often requires technical assistance from, for example, technology suppliers, consultancy services and training of personnel.

6. Sophistication level of licensed technology

Sometimes, MNC licences to non-affiliates are for technologies of an intermediate generation, that is, not their latest technology. Technologies licensed to independent companies by MNCs may be significantly older than those licensed to their foreign subsidiaries. A non-affiliated licensee looking for the most recent technology should be aware of that during negotiations.

7. Nature of the technology transfer market

The properties of the international market for technology derive to a substantial degree from the nature of the commodity being traded, that is, technical knowledge. Compared with other goods, technology reveals several peculiar features. Knowledge, for example, is intangible, cumulative, easily transmitted, and transnational and cannot be consumed. Unlike material goods, it constitutes an intellectual commodity. Its essence is information that enables the production process. Whereas their physical content and structure largely determine the utility of material goods, the utility of technology is an ever increasing knowledge base that enables the production of a continuous stream of new products and services.

The process of generating technical knowledge differs substantially from the process of producing material commodities. It has a cumulative character. The present stock and level of technologies in the world result directly from the scientific and technical developments achieved by past generations. The "production" of technical knowledge has been made possible by the creation and accumulation of inconsumable resources in the past. The cumulativeness of technology means that it is sometimes difficult to link directly a discovery that extends our understanding of the surrounding world with a concrete innovation that derives from the general idea. That contrasts with the manufacturing process, where the origin and components of material products can be easily identified.

Technology, as a production factor, does not wear out physically. However, because technical knowl-

edge accumulates continuously, existing technology becomes obsolete and is replaced regularly. Technical knowledge wears out only economically, whereas material goods wear out both physically and economically. The physical inconsumability of technical knowledge implies that a given technology can be sold and used for a practically unlimited number of times without diminishing its substance. Depending on the number of transactions, sales revenues may be many times greater than the costs of technology "production". In other words, the elasticity of supply of technical knowledge is, in the short term, close to infinity, which is not the case with any other commodity.

The ever growing scale and rate of technology dissemination outside national boundaries stems from the ease with which it is transmitted. Owing to the rapid development of telecommunications and computer communication networks, technology has become more mobile than ever. As a result, the lag between discovery or technical development and worldwide dissemination of the relevant information has shortened dramatically.

The owner of technology has an information monopoly that is strengthened by legal protection under patent systems and other IP rights. That gives the owner of the technology something of a double security system. Even if the technology monopoly is broken, the legal monopoly still provides protection: a potential buyer can access proprietary technology only when the rights to the use of such technology are legally acquired.

The weaker negotiating position of a buyer derives from a relative lack of information regarding the technology that the buyer is endeavouring to acquire.

An additional factor impairing the bargaining position of a technology buyer, which may be particularly strong in developing countries, is the discrepancy between the levels of technological and economic development of supplier and recipient—both in general and with respect to the given technology. The greater the technological gap, the lower the buyer's general economic efficiency in general and the less capable the buyer is of effectively absorbing, assimilating and implementing imported innovations and the knowledge of the technology to be purchased and alternative technical solutions. The relative ignorance of the technological buyer is a key factor in the balance of strength between the parties involved in technology transfer transactions.

Of particular importance is an evaluation of the general price determinants of the technology that will have an impact on negotiation and final values. For developing countries, it is necessary to assess the relative access to information, the relative bargaining power of the parties, the availability of alternatives and the knowledge or lack of it of the acquirers.

TECHNOLOGY TRANSFER OPERATIONS
TECHNOLOGY ACQUISITION

- **Mechanisms of technology management**
- **Core competences**
- **Selection processes**
- **Barriers and determinants (internal and external)**

(Confidentiality exercise)

TECHNOLOGY TRANSFER OPERATIONS
TECHNOLOGY ACQUISITION

Mechanisms of technology management

Aspects of technology management

- Value creation mode
- Value extraction mechanisms

Value creation focus on the human capital

- Innovation
- Process culture
- Customer relations
- Organizational culture
- Knowledge management

TECHNOLOGY TRANSFER OPERATIONS
TECHNOLOGY ACQUISITION

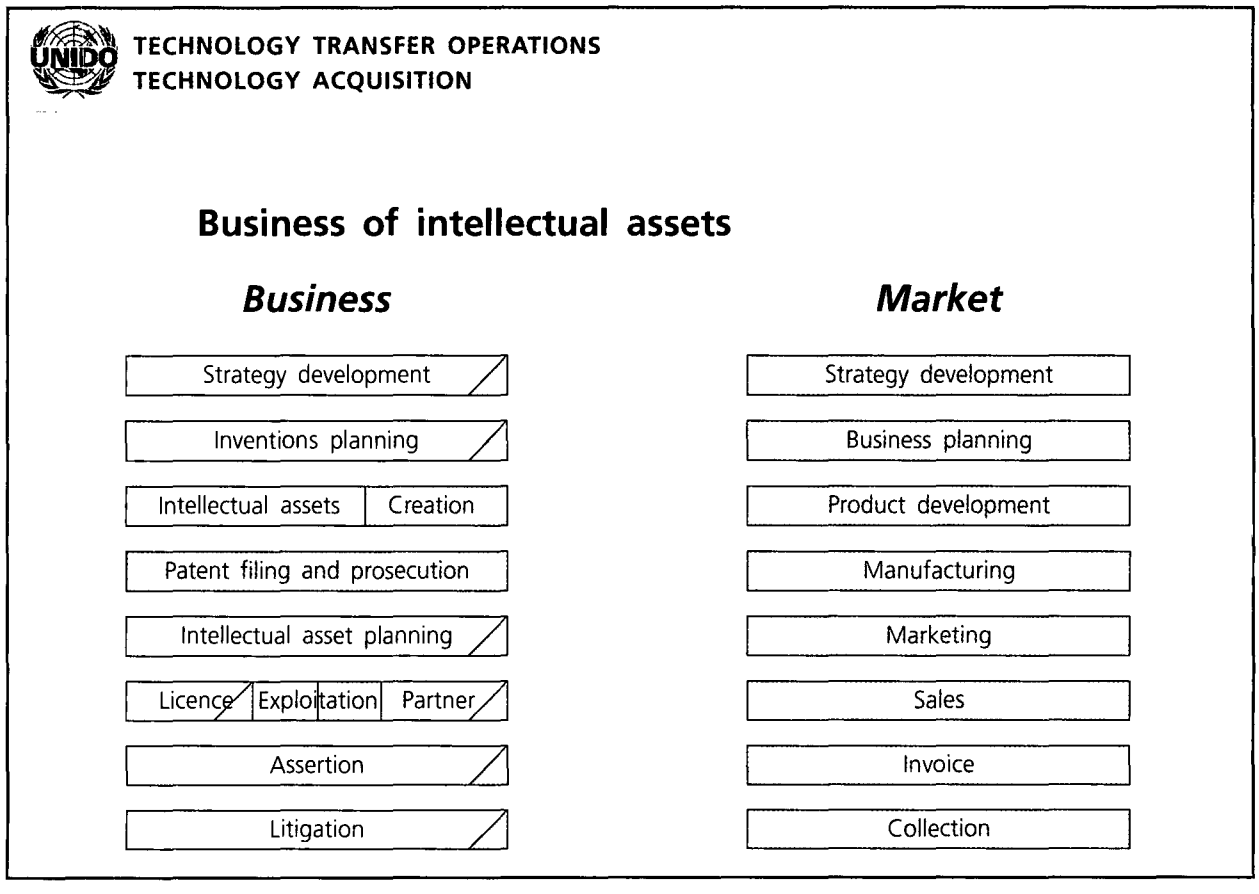
Value extraction focus on intellectual assets

- Asset management systems
- Databases
- Decision and management processes
- Practised work processes
- Organizational capabilities

TECHNOLOGY TRANSFER OPERATIONS
TECHNOLOGY ACQUISITION

Value extraction mechanisms of intellectual assets

- Outright sale
- Donation
- Licence
- Joint venture or alliance
- Reduction in competitive threat
- Incorporation into existing business
- Creation of a new business


TECHNOLOGY TRANSFER OPERATIONS
TECHNOLOGY ACQUISITION
Business of intellectual assets
Business
Market
Strategy development
Inventions planning
Intellectual assets
Creation
Patent filing and prosecution
Intellectual asset planning
Licence
Exploitation
Partner
Assertion
Litigation
Strategy development
Business planning
Product development
Manufacturing
Marketing
Sales
Invoice
Collection

TECHNOLOGY TRANSFER OPERATIONS
TECHNOLOGY ACQUISITION

Core competences

Definition: "The specific technologies that will allow a corporation to sustain a competitive advantage over time."

(C. K. Prahalad)

Characteristics of core competences

- Need to be defined narrowly
- Need to be manageable
- True differentiation from others
- Few and distinct
- Needed for survival of corporation
- Need constant nurturing and renewal

TECHNOLOGY TRANSFER OPERATIONS
TECHNOLOGY ACQUISITION

Management of core competences

- Technology (research and development)
- Human resources (personnel)
- Strategy and vision (business)
- Intellectual assets (intellectual property protection)

Define strengths and weaknesses, identify gaps and threats

TECHNOLOGY TRANSFER OPERATIONS
TECHNOLOGY ACQUISITION

The selection process

Acquiring the technology to support the strategic plan

- Internal sources
  - Tacit knowledge
  - Internal research and development
- External sources
  - Purchasing
  - Licensing
- Combination of internal and external
  - Reverse engineering
  - Strategic partnership

TECHNOLOGY TRANSFER OPERATIONS
TECHNOLOGY ACQUISITION

Continuum from purely internal to purely external

- Seizing tacit knowledge
- Internal research and development
- Internal research and development with networking
- Reverse engineering
- Technology transfer and absorption
- Contract research and development
- Research and development strategic partnership
- Licensing
- Purchasing
- Joint venture
- Acquisition of a company with technology

TECHNOLOGY TRANSFER OPERATIONS
TECHNOLOGY ACQUISITION

Choosing the best source option for your company

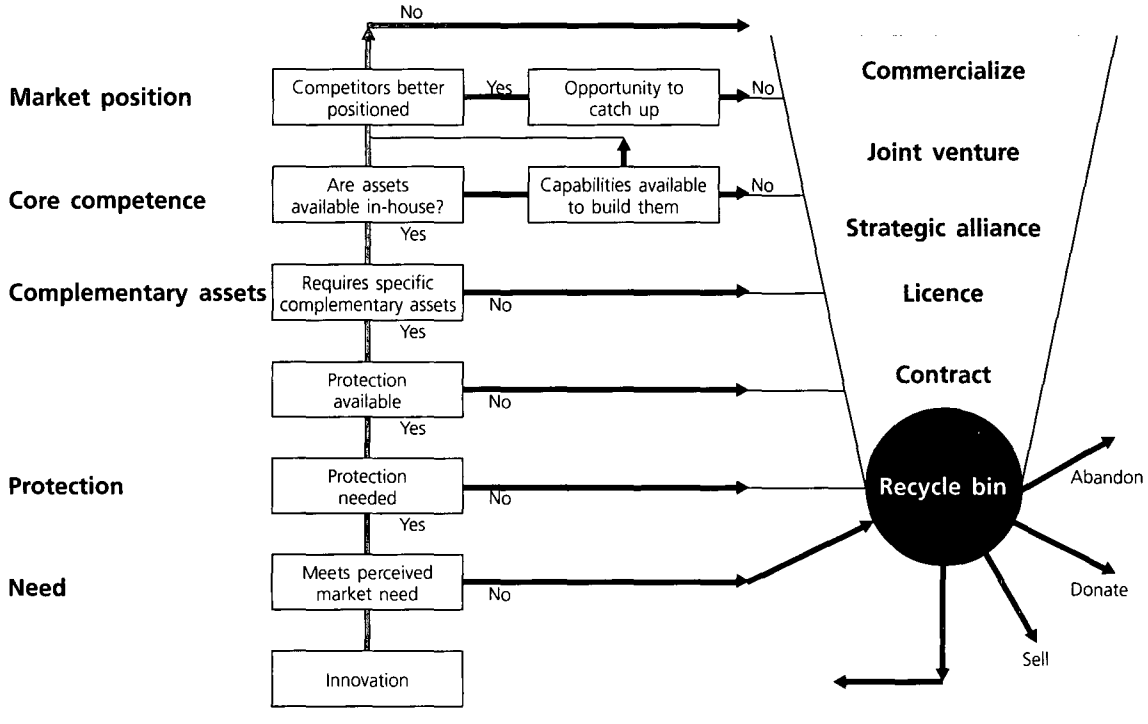
Assess the advantages and disadvantages

- Company technological growth
- Exclusivity/competitive advantage
- Company capability
- Time to market
- Risk of failure
- Costs/affordability

Consider all and choose the best overall option

TECHNOLOGY TRANSFER OPERATIONS
TECHNOLOGY ACQUISITION

Exploitation of intellectual assets



TECHNOLOGY TRANSFER OPERATIONS
TECHNOLOGY ACQUISITION

Internal technology sources

Advantages	Disadvantages
• Company technological growth	• Takes longer
• Exclusivity/competitive advantage	• May lack capability
	• Higher risk of failure

Costs could be high or low, depending on the situation

TECHNOLOGY TRANSFER OPERATIONS
TECHNOLOGY ACQUISITION

External technology sources

Advantages	Disadvantages
• Reduced time to market	• Low technological growth
• Reduced risk	• Give up exclusivity advantage
• Address internal capability	• Have to adapt the technology

Costs generally lower, but be sure to consider the cost of implementation

TECHNOLOGY TRANSFER OPERATIONS
TECHNOLOGY ACQUISITION

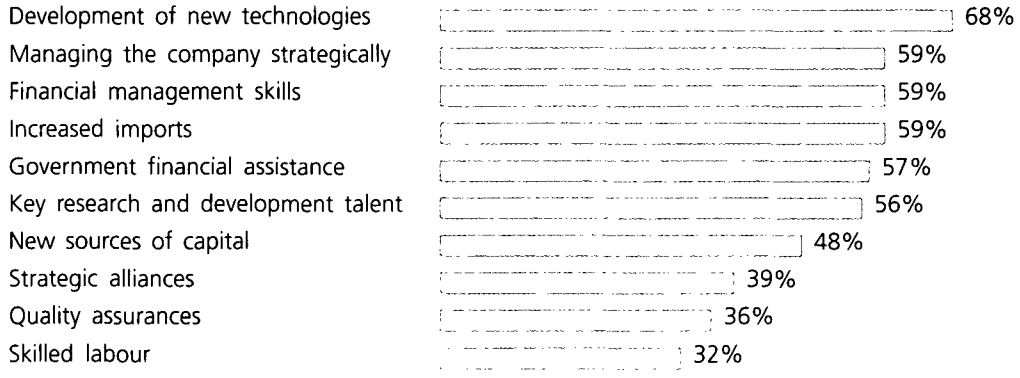
Combination of internal and external sources

Advantages	Disadvantages
• Share risks	• Reduced technological growth
• Share costs	• Implementation problems
• Can result in exclusivity	• Have to share information
• Reduced time to market	

Costs generally between internal and external costs

TECHNOLOGY TRANSFER OPERATIONS
TECHNOLOGY ACQUISITION

Top success factors in global competitiveness



TECHNOLOGY TRANSFER OPERATIONS
TECHNOLOGY ACQUISITION

Seizing tacit knowledge

Advantages and benefits

- Knowledge exists in company, so low cost, low risk
- Improves other processes
- Not lost when a person leaves
- Improves employee morale

Disadvantages and risks

- More people on learning curves
- Documentation, training costs

Cost factors

- Extra staffing while learning
- Documentation

TECHNOLOGY TRANSFER OPERATIONS
TECHNOLOGY ACQUISITION

Internal R&D

Advantages and benefits

- Develop knowledge in company = stronger company
- Exclusivity = competitive advantage
- There may be tax or other government incentives

Disadvantages and risks

- Long time to market
- Generally more expensive than external acquisition
- Risk of failure = loss of investment and time
- May not have research and development expertise, equipment and so on

Cost factors

- Research and development staff
- Equipment
- Office, laboratory and shop space

Internal R&D with networking

Advantages and benefits

- Develop knowledge in company = stronger company
- Exclusivity = competitive advantage
- There may be tax or other government incentives
- Staff exposed to other sources of ideas

Disadvantages and risks

- Long time to market (shortened somewhat)
- Networking costs added, overall costs down
- Risk of failure reduced (better knowledge base)
- Inventiveness can be curtailed

Cost factors

- Research and development staff, equipment, space
- Attending trade shows, conferences
- Reading relevant journals and magazines

TECHNOLOGY TRANSFER OPERATIONS
TECHNOLOGY ACQUISITION

Reverse engineering

Advantages and benefits

- Less costly, less risky, less time compared with internal research and development
- Opportunity to improve product to gain competitive advantage

Disadvantages and risks

- "Me too" product
- Risk of not fully understanding the original design
- Some legal risks

Cost factors

- Strong engineering capability
- Some office, laboratory and shop space
- Possible legal costs

TECHNOLOGY TRANSFER OPERATIONS
TECHNOLOGY ACQUISITION

Technology transfer and absorption

Advantages and benefits

- Reduced risk owing to known technology
- Reduced time to market
- Develops internal capability

Disadvantages and risks

- Risk in applying technology to new application
- Very little support available

Cost factors

- Searching, networking
- Some Internet technical staff
- Adaptation/adoption costs

TECHNOLOGY TRANSFER OPERATIONS
TECHNOLOGY ACQUISITION

Contract R&D

Advantages and benefits

- No investment in facilities
- Low investment in staff
- Own technology = unique product

Disadvantages and risks

- No hands-on knowledge in-house
- Harder to keep confidential
- Same time, cost and risk issues as internal research and development

Cost factors

- Staff to understand technology, manage contract
- Contractor fees: may be lower than internal research and development

TECHNOLOGY TRANSFER OPERATIONS
TECHNOLOGY ACQUISITION

R&D strategic partnership

Advantages and benefits

- Share risk
- Lower cost
- Learn from partners

Disadvantages and risks

- Have to share knowledge with partners
- Have to adapt research results to own application

Cost factors

- Company's share of research and development staff, equipment, facilities
- Post research implementation costs

TECHNOLOGY TRANSFER OPERATIONS
TECHNOLOGY ACQUISITION

Licensing

Advantages and benefits

- Costs and risks less than internal research and development
- Less time to market
- Implementation support available

Disadvantages and risks

- May not have exclusivity
- Implementation risks, costs
- Do not develop internal capability

Cost factors

- Advance and royalty payments
- Implementation costs

TECHNOLOGY TRANSFER OPERATIONS
TECHNOLOGY ACQUISITION

Purchasing

Advantages and benefits

- Quickest, ready to use
- Lowest risk, proven technology
- Implementation support

Disadvantages and risks

- Exclusivity, competitive advantage issues
- Possible implementation problems
- Builds little technical strength

Cost factors

- Advance payment
- Training costs

Should be lower than developing costs because development costs are shared by many

TECHNOLOGY TRANSFER OPERATIONS
TECHNOLOGY ACQUISITION

Joint venture with technology provider

Advantages and benefits

- Immediately able to be implemented after training
- Proven technology—low risk
- Probable exclusivity in a region

Disadvantages and risks

- Market risks
- Do not have control: have to agree with partner
- Does not develop technical strength

Cost factors

- Advance investment in the new business
- Ongoing operational costs
- Training costs

TECHNOLOGY TRANSFER OPERATIONS
TECHNOLOGY ACQUISITION

Acquisition of a company with the technology

Advantages and benefits

- Immediately able to be implemented after training
- Low risk
- Could buy good image

Disadvantages and risks

- May have to adapt technology to needs
- May acquire negative baggage
- May have merger problems

Cost factors

- Depends on purchase price of the company
- Should be proportional to technological assets

TECHNOLOGY TRANSFER OPERATIONS
TECHNOLOGY ACQUISITION

Summary

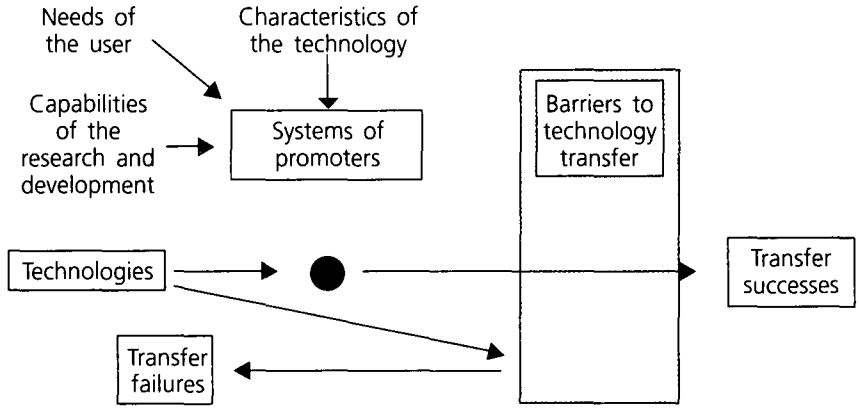
There are internal, external and combination internal/external sources of technology. Companies need to assess the advantages and disadvantages of all sources considering:

- Company technological growth
- Exclusivity/competitive advantage
- Company capability
- Time to market
- Risk of failure
- Costs/affordability

Appropriately timed technology acquisition from the appropriate sources can have impressive results

TECHNOLOGY TRANSFER OPERATIONS
TECHNOLOGY ACQUISITION

Barriers to technology transfer



TECHNOLOGY TRANSFER OPERATIONS
TECHNOLOGY ACQUISITION

Problems in the implementation of technology development projects

- Understanding costs, risks and benefits
- Understanding the application
- Lack of appropriate measures
- "Go"/"No go" decision-making
- Communications
- Management commitment
- Slipping schedule

TECHNOLOGY TRANSFER OPERATIONS
TECHNOLOGY ACQUISITION

Technology development project problems

Understanding costs, risks, benefits

Problems:

- Costs, risks and benefits are undefined
- Researchers do not think in terms of costs
- Managers do not understand technology development

Solutions:

- Undertake activities to define
- Involve marketing, manufacturing
- Involve strategic planning
- Set goals, gates
- Insist on cost, time, budgets
- Constantly revise estimates
- Manage project with stage-gate
- Communicate risks, benefits
- Use stage-gate process

Key to success→Two-way communication and stage-gate process

TECHNOLOGY TRANSFER OPERATIONS
TECHNOLOGY ACQUISITION

Technology development project problems

Understanding the application

Problems:

- Researchers prefer laboratory
- Research and development will never know all about the application
- Application experts do not understand technology

Solutions:

- Take them to the real world
- Put an application person on the team
- Put customers on the team
- Two-way communication
- Experiments to reduce risk

Key to success→Full exposure of research and development to application and users

TECHNOLOGY TRANSFER OPERATIONS
TECHNOLOGY ACQUISITION

Technology development project problems

Lack of appropriate measures of progress

Problems:

- Understanding the need
- Knowing what to measure
- Cultural differences between management and research and development workers

Solutions:

- Connection between future sales and timely research and development activities
- Identify what is needed to reduce risk and make "Go"/"No go" decisions
- Communicate each other's needs and respect each other's needs

Key to success→Understanding the big picture and each role's importance

TECHNOLOGY TRANSFER OPERATIONS
TECHNOLOGY ACQUISITION

Technology development project problems

"Go"/"No go" decision-making

Problems:

- No planned decision points
- Unable to decide
- Unwilling to terminate the project

Solutions:

- Use stage-gate process
- Emphasize acquiring information for the decision process
- Business decisions override
- Acknowledge efforts
- Some losses are part of risk-taking
- Learn from efforts

Key to success→Acquire information that reduces risks and willingness to make informed decisions

TECHNOLOGY TRANSFER OPERATIONS
TECHNOLOGY ACQUISITION

Technology development project problems

Communication

Problems:

- Research and development not disclosing progress
- Management not interested in progress
- Research and development hiding problems

Solutions:

- Teach importance of knowing
- Teach overall connection of project to business
- User-friendly forms, meetings
- Stage-gate process
- Participation in strategic plan
- Communicating failure is not bad

Key to success→Understanding the needs of others

TECHNOLOGY TRANSFER OPERATIONS
TECHNOLOGY ACQUISITION

Technology development project problems

Slipping schedule (guaranteed to happen)

Problems

- The development was not as easy as first thought
- Solution not possible or affordable

Solutions:

- Expect this, build into schedule and budget
- Design project to address difficult parts first
- Communicate problems early
- Be willing to seek expertise
- Design project to identify "No go" early
- Have contingency plan

Key to success→Plan and communicate

TECHNOLOGY TRANSFER OPERATIONS
TECHNOLOGY ACQUISITION

Barriers and determinants—exterior

- Geographical concentration
- Industry and company concentration
- Technology and research and development correlation
- Technology trade versus foreign direct investment
- Technology trade and markets for other services
- Sophistication level of licensed technology

TECHNOLOGY TRANSFER OPERATIONS
TECHNOLOGY ACQUISITION

Nature of the technology market—exterior

Knowledge is:

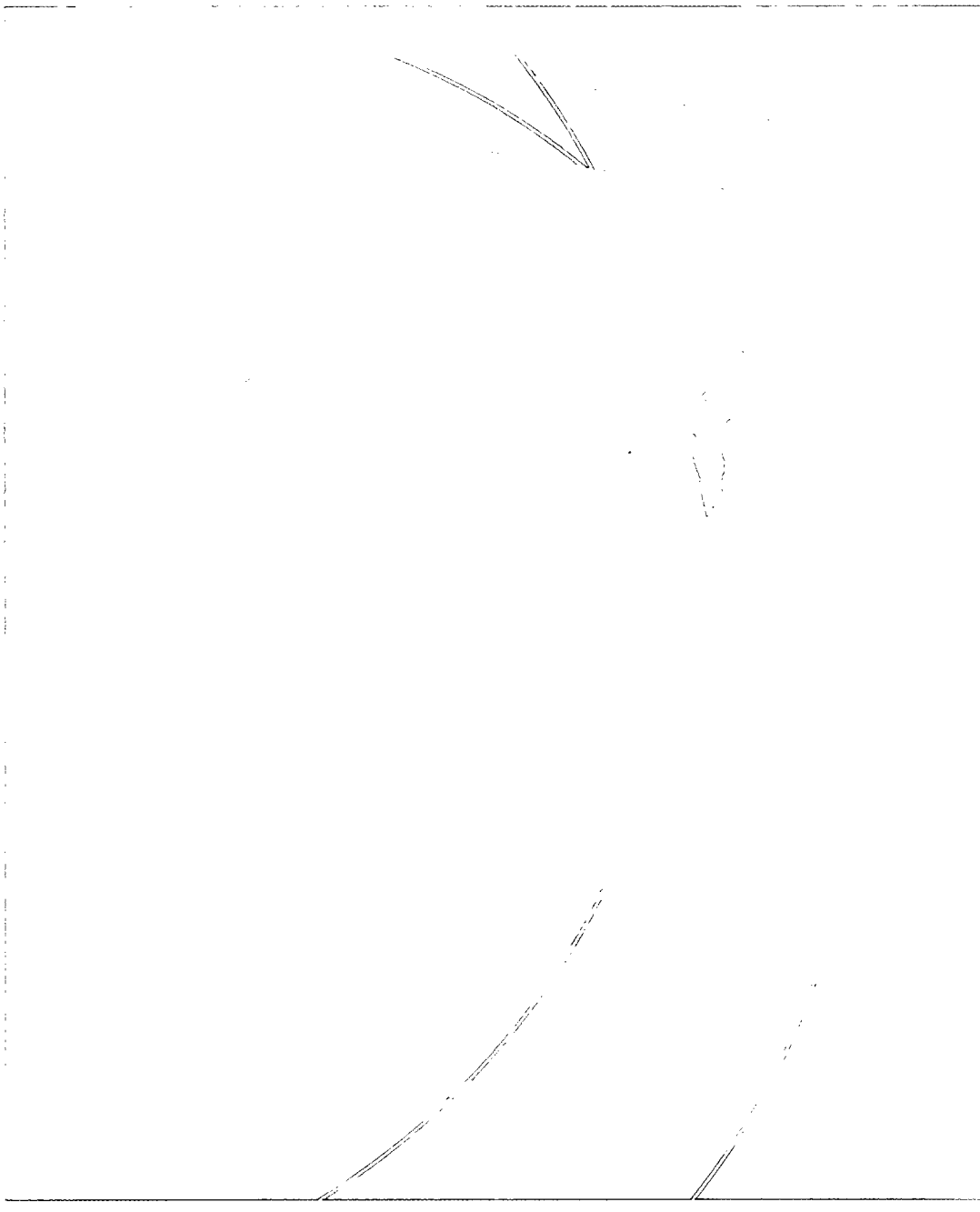
- Intangible
- Cumulative
- Physically not able to be consumed
- Transmittable
- Transnational

TECHNOLOGY TRANSFER OPERATIONS
TECHNOLOGY ACQUISITION

Price determinants of technology

- Information monopolies
- Doubles security (inventions, patents and trade marks + contracts)
- Weak bargaining power
- Relative ignorance of buyers
- Few or no alternatives

III. TECHNOLOGY SOURCING



III. TECHNOLOGY SOURCING

A. Overview

Overview of technology sourcing

- Challenge to the developing countries
- Sources of information
- Strategic analysis as a sourcing tool

Challenge to the developing countries

Relative weakness in the field of information

- Infrastructure
- Internet access
- National information policy
- Geographical remoteness
- Language skills
- Interpretation skills and experience

Many developing countries have a relative weakness in the field of technology sourcing as a result of multiple factors, related to a less developed information infrastructure, geographical remoteness, limited language skills and weakness in interpretation experience.

The advent of electronic information has somewhat reduced those handicaps.

There are many sources of industrial and technological information to address the interests of potential licensees and investors (those looking for a supplier of technology or a product to manufacture) and potential licensors (those looking for an appropriate licensee). Despite the large amount of information available, the people who need it often do not know that it exists or do not know where to find it.

A number of international organizations have developed elaborate and easily accessible databases to find information on technology and technology sourcing. Among them are the United Nations Industrial Development Organization (UNIDO), the World Intellectual Property Organization (WIPO), the Organisation for Economic Cooperation and Development (OECD), the United Nations Conference on Trade and Development (UNCTAD) and others.

UNIDO is a specialized agency of the United Nations whose primary objective is to promote and accelerate industrial development in developing countries. Within that general mandate lie priority areas, one of which involves the collection and dissemination of industrial and technological information to users in developing countries. It offers a number of services, including:

- A network of national and regional focal points that serves to decentralize information generation and dissemination. National and regional focal points also provide industrial inquiry and advisory services. With support from the UNIDO Exchange.

- An international referral system, which is designed to redirect queries to a wide range of well chosen sources of industrial and technological information.

- The Industrial Information System is a computerized form of Industrial Development Abstracts, which contains information generated by UNIDO and held in over 20,000 titles and abstracts.

- Sectoral information networks. The Energy and Environment Information System is a source of industry specific environment information for small and medium-sized enterprises (SMEs) in developing countries.

When a technology has been traced to a particular country, another source of information is the national patent office of that country or its commercial and trade attachés.

Regional development banks, such as the African Development Bank, the Asian Development Bank and the Inter-American Development Bank, may also be a source of technology information.

WIPO offers technical assistance to developing countries. One of its programmes is State-of-the-Art

Search, which has been created mainly for the use of government organizations in developing countries. It enables the user to receive, free of charge, a report on the latest achievements and general technological level in a particular field and also copies of patent documents.

Private sources include corporations, industrial or professional associations, universities, research facilities, scientific publications and journals. It is recommended to first search such sources on the Internet whenever possible to expedite and simplify the process. The following are some ideas that may help:

- Industrial fairs and trade shows
- Engineering or consulting engineering bureaux
- UNIDO and other international organizations
- Private technical information services
- Patent literature
- Technical journals
- Trade and professional associations such as the Licensing Executives Society International, which is active in over 50 countries. The Society publishes an international technology directory that is posted on its web site (www.lesi.org)
- Technology, patent and licensing brokers and consultants
- Universities or other academic institutions
- Scientific reviews
- Professional referral periodicals such as *Chemical Abstracts*
- Engineering handbooks
- Documentation centres
- Chambers of commerce (may help to find potential suppliers or manufacturers of products)
- Information services of libraries
- Engineers working in R&D for companies in the field
- Personal contacts
- Contacts with manufacturing companies
- Proceedings of technical meetings
- Trade directories
- *Who's Who?* and *Who Does What?* directories
- Licensing news services
- Institutional special technology information services
- Market research services

Additionally, some companies have specialized in posting available technologies on the Internet and will arrange meetings and contracts for a fee. This is a fast evolving field and players enter and exit quickly. At present, the most notable sources are YET2.com, PLX, PATEX and DELPHION.

B. Strategic analysis of opportunities

In order to find technology effectively and efficiently, it is essential to start with a strategic analysis of technology choices. Such an analysis should include an initial inventory step (e.g. "Where are we now?"), followed by a clear vision of what the final results should be (e.g. "Where do we want to go?"). Only when those two factors have been determined, can a sourcing strategy begin.

The initial analysis should include:

- Competitive analysis of the market and its characteristics, such as the five forces model
- Thorough understanding of the market needs and how to fulfil them
- Benchmark of the best competitors

The results of the total analysis need to be correlated with one's own strengths and weaknesses. Success is not random or automatic. All the evidence indicates that technology strategy is about planned commitment.

What can be learned from studies of technological competence is that it cannot be acquired overnight. It has to be learned and absorbed. Even when firms buy other firms in order to acquire new competences, there is a lengthy period before the new competence is efficiently absorbed, so building

and deploying technological competence for competitive advantage is a long term strategic concern. Not only is innovation uncertain, but the risks are increasing.

Two further forces pushing for a strategic approach to technological change are the increasing number of competitors (including more international players) and the changing basis of competition. No longer is it sufficient to offer products or services that compete on price alone. Increasingly the emphasis is on non-price factors such as design, quality, delivery speed, service and customization. It is not possible to ignore such changes—even if the export market is not of direct concern—as the risks of import competition are increasing all the time.

Technology strategy is concerned primarily with how an organization chooses and uses technology for strategic advantage. There are three aspects to be considered:

- Strategic analysis—what could be done, and why?
- Strategic choice—what is going to be done, and why?
- Strategic planning—how are the choices going to be implemented successfully?

Strategic analysis of opportunities

- Need for a strategic approach
- Development of a strategy
- Strategic choices

The need for a strategic approach to technology choices

- Success is not random or automatic
- Need for a long-term plan
- Increasing risks and scale
- Increasing and changing basis of competition
- Increasing pace of technology change
- Increased threats and opportunities

Developing technology strategy involves trying to answer the following questions as fully as possible:

- Where is the organization now?
- Where does it want to get to?
- How does it get there?

It also involves learning from previous experience. It is a continuing cycle in which the firm learns more and more about its environment, its own capabilities and how to develop them successfully over time. That stage is really about looking at what could be done and why. It involves making sense of the signals and linking them to the overall strategic direction of the business, reviewing the current position of the firm and looking forward to where it wants to go.

What needs to be understood is the nature of the different challenges and opportunities and how to pick up clear signals about the most urgent and significant options for change. That will allow building a clear picture of the key issues that need to be considered.

There are many techniques for doing so, but for present purposes the focus will be on three simple aids:

- The five forces model
- Competitiveness profiling
- Value stream audit

The *five forces model* is a simple map that represents the competitive strategic battlefield in terms of five forces that interact to shape the challenges for firms, as follows:

- The competitive rivalry between firms themselves—the various players in a particular sector or industry who are trying to do the same things
- Bargaining power of suppliers
- Bargaining power of customers
- Threat of substitutes—a company's strategic position depends on the extent to which what it

offers is unique and cannot be replaced by something else

- Threat of new entrants—the final way in which a company's competitive position can be altered is through the entry of new competitors who may offer the same products or services at lower prices or with some other advantages. The extent to which there are high entry barriers, for example, high capital cost or difficult to acquire knowledge, is an indicator of strategic strength

The main purpose of the model is to provide a structure on which to base discussions and decisions.

A second powerful tool for strategic analysis involves creating a simple *competitive profile* of how products and processes match up to what the market wants and what the best competitors can offer. The step-by-step process is well suited to discussion in groups and provides a powerful way of building a shared awareness of the strategic challenges facing the firm.

- *Step 1* involves reviewing and focusing on the business. It deals with the different attributes that the business offers.

- *Step 2* involves identifying the market requirements for performance, which involves defining those factors which have to be present simply to be able to enter the particular competition. Essentially, stage 2 involves building up a map of what the market requires and what competitors are achieving, as a means of setting clear targets towards which capability improvement must be directed.

- *Step 3* involves answering the question: "How well do we meet those demands?" The purpose is to help focus the analysis of the market on key strategic drivers and to identify where and what has to change. Step 3 is concerned with reviewing this internal capability to meet those performance targets. It can be a review of strengths and weaknesses of individual elements or functions in the product or process or a wide look at the appropriateness of the process itself in the light of prevailing technological and market conditions.

- *Step 4* involves exploring the range of innovations possible for effecting improvements in those areas identified in step 3.

- *Step 5* reviews the potential choices and selects options based upon some set of priorities, which may be technological or market-related. The key is to ensure that choices made are appropriate and do not represent the development of capability that does not match market need.

The *value stream audit* technique is designed to identify internal strengths and weaknesses—what it is about the firm that helps achieve the strategic goal of competitive advantage and what gets in the way. It can be applied inside the firm or along its wider supply and distribution chain.

Such an analysis quickly focuses on where change is needed and throws up opportunities for change. It is based on the idea that the firm consists of a sequence of activities, each of which is designed to add some value to the product or service as it moves through. At each stage, value is being added, but so are costs. In addition, there are overheads that add to the cost and supports the overall running of the business as well as a component of waste associated with each activity and with the flow through the organization.

Value stream analysis involves drawing up a flow chart for the business and then asking, at each stage (including the stages between activities), whether cost and waste or value is being added.

The results of those three analyses will give a picture of what direction changes are needed and the range of possible options for change.

Three more pieces of information help in making a choice:

- Fit with the overall business strategy—is it going to take the business in the direction that it wants to go?

- Fit with competence base—does the technological change build on or add to existing competence?

- Fit with implementation capability—are the challenges of actually doing it (inside and outside the firm) manageable?

One of the first questions that can be answered is the preferred approach with respect to technological change (an aggressive first mover or a fast follower specializing in a particular niche). Whatever the choice, it is important to think about positioning and obtaining a good match between what is attempted and the resource base available to support it.

The second question concerns the current technological base of the firm, its distinctive technological competence, that is, what it knows about its product or service and how it is produced or delivered effectively. Such knowledge may be embodied in particular products or equipment but is also present in the people and systems needed to make the process work. The important thing is to ensure that there is a good fit between what the firm currently knows about and the proposed changes it wants to make.

Some form of map or audit framework is needed and there are many approaches possible. The following three may help with the process:

- The product/process matrix
- The competence audit
- The portfolio model

The *product/process matrix* involves plotting two axes, one for the product families that the firm currently makes and one for the processes that it uses. That effectively defines the area within which the firm is operating in terms of its technological competence.

The *competence audit* involves asking whether the new proposal fits somewhere within the space or lies outside it, which will require the acquisition of new competence. If it lies outside, the question to ask is how the gap will be closed (high-risk or incremental advance).

Much innovation involves progress along one axis, keeping the other constant. For example, developing a new product family using processes with which the firm is familiar is relatively low in risk. Similarly, employing a new process to make a well understood product is relatively low-risk. Where the change involves both product and process, the risks are high.

The representation can be changed, for example, to explore the space around products and markets, or processes and materials, and the matrix can be extended to multiple dimensions. In each case, the axes represent knowledge space within which the firm has experience and outside of which will involve higher-risk learning of new competence.

Another useful tool for looking at potential new technologies is to map them on to a simple *portfolio model*. Typically, new technologies can be classified into groups, such as:

- Basic or generic technologies—widely available, often not protected by patent and hard to defend as a source of strategic advantage.

- Proprietary technologies—those which the company owns and may have control over, via patents or other protection, or may have special knowledge or equipment that would make it hard for others to enter.

- Pacing technologies—the set of technologies that are defining the rules of the game in the market place, but may not yet be proprietary or generic.

- Emerging technologies—those which are still a long way from commercial exploitation but which may represent a major force if they come to fruition. Technologies of that sort need watching and exploring as they become more significant.

They can be mapped on to a simple portfolio and the question to follow up can be the extent to which they support or affect current and likely future business. Other questions raised include positioning new technological possibilities in terms of how much they will cost to enter, how defensible will they be and how far from core competences they are.

Screening techniques are another important internal selection mechanism. In many firms, the choice is not necessarily of going for only one product concept but of selecting likely runners for further exploration and development. Techniques for screening range from simple judgemental methods to complex mathematics. However, it is important to recognize that even advanced and powerful screening tools will only work if the corporate will is present to implement the recommended decisions.

A simple tool that can be used to help in such a process of choice is a *decision matrix*, which provides a focus for looking at various options against a number of agreed criteria:

- List the options that are competing for strategic support.
- Make a list of the key checks already discussed. Does it fit the competence base? Does it fit the business strategy? How feasible is its implementation?
- Add some indication of the expected costs and benefits associated with the different projects. Again, options where the expected costs or benefits are not attractive are dropped.
- Add a total score column that tries to arrive at some priority based on the individual cells.

Most decision matrices use a simple rough-cut version designed to eliminate the low potential options and then gradually repeat the exercise adding more criteria.

C. Tools and methods

A number of tools have been developed over the last 10 years to facilitate finding potential sources of technology. Such tools were developed principally to analyse patent portfolios.

Tools can be divided into four categories:

Summary

- Tools allow for the search for and importation of data from many sources
- Tools allow the user to take unstructured data and visualize information that leads to knowledge
- Many tools such as Cartia, Hyperbolic Citation and Claims Trees help facilitate this visualization:
  - Numerous report modules are available to construct tables, graphs and charts to help the analysis
  - Iteration allows for quick "what if" analysis

- Analysis
- Searching
- Visualization
- Information and promotion

A special category of tools centres on measures. Some tools overlap a number of types. Referring to the previous modules, technology measures have been developed around human resources, technology itself and intellectual property. In any case, measures developed and used should be consistent with the strategic goals. The wrong measures will focus management and, therefore, the whole corporation, in the wrong directions.

As examples of measures centred on the "human" side, the following have been frequently used, but are by no means the only ones:

- Degreed staff
- Retained staff
- Training given
- Performance reviews against goals and objectives

It should be noted that a number of those measures focus on the quality of the "human capital" of an organization.

Measures around technology itself are more commonly used. Examples include:

- Internal versus external R&D—measures the openness of an organization
- Return on R&D investment—macro measure attempting to quantify efficiency of R&D; cannot be done on a small scale
- New products as a result of R&D—percentage of new products introduced in a given period of time (the definition of "new product" per se can be touchy)
- Invention productivity—measures include number of disclosures or patent application per year, percentage of issued patents over a given period, number of inventions filed or issued per R&D investment, etc.
- Age of key inventors—a measure giving a profile of diversity and future growth potential
- Inventor concentration includes percentage of inventors responsible for most inventions as well as geographical distribution—another measure of potential growth and diversity
- Computer analyses also allow following productivity of inventors over time

The most frequently used tools include citation analysis, patent trees and patent mapping. Citation analyses are based on those technologies and patents that have to be cited as prior art in the prosecution of a new patent. Computerized models allow all relevant patents in a defined field and new entrants in the field to be determined quickly. It shows who is developing the art, which parts of the technology are changing faster or disappearing. It also indicates the existence of parallel technologies.

Such tools also statistically cluster patent documents according to themes. They allow peaks and valleys of technology to be visualized just as a geographical map would. They are used to track changes in technology emphasis over time, including competitive positioning.

A thorough analysis will allow finding new relationships between materials, processes, uses or companies. It serves as an analytical tool to determine potential licensable technologies and from whom. Such tools are extensively used for a competitive analysis.

Patent trees and patent mapping make it possible to analyse trends and define potential replacement technologies. Patent trees are a combination of succeeding and parallel patents pertaining to a given technology. Patent maps are more complex models, mapping into a three-dimensional model a technology field based on the underlying patents. Such tools are available through a number of publicly available sources.

A number of specialized Internet sites were mentioned previously to help locate which technologies are available, from whom and for what applications.

D. Assessment

Once the decision has been made to pursue a certain technology, it is important to assess that technology in the context of the possible acquirer. It is not a substitute for a more formal valuation (pricing) that will take place later in the negotiation process.

Assessment

Importance of assessment

Poor performance of imported technologies is due to:

- Poor negotiation
- Inattention to technical/economic factors
- Poor inquiry/probing approaches
- Lack of analytical knowledge
- Preponderance of obsolescent technologies
- Required prior to contractual agreement
- Not a substitute for valuation

Assessment of the technology will take into consideration the life cycle of the product issued from the technology as well as the life cycle of the technology itself. Those factors will greatly affect its potential benefit.

The assessment will evaluate the appropriateness of the technology for the acquirer and its inherent risks. It is a qualitative rather than a quantitative evaluation, based mostly on the context and the environment of the future development. It will enable potential requirements of the acquirer to be pointed out that will need to be answered in the ensuing negotiation.

Poor performance of imported technologies may be due to different factors. The most common ones focus either on poor preparation of the technology transfer process or lack of adequate skills or experience in the field by the decision makers.

Lack of preparation leads to poor negotiation and poor inquiry. Lack of skills or experience creates inattention to technical and economical factors, and poor analytical knowledge.

1. Product and technology life cycles

It is helpful to consider the implications of product and technology life cycles for technology evaluation. The curve of the product life cycle is S-shaped and shows three phases: growth, ascent and maturity.

The product and technology life cycles

Product life cycle

- Involves many "cycles" of evolution but basic features persist, e.g. aircraft
- Long cycle life: 40 to 70+ years, e.g. propeller aircraft to jet aircraft

Technology life cycle

- Product life cycle comprises many technology life cycles
- High-value technology has a short life cycle, e.g. computer technologies

More than one cycle for the same basic product represents different cycles of innovation within one industry. Over a long period, such curves become a part of a single S-curve and can, in turn, be reanalysed into the growth, ascent and maturity phases. They will reflect the growth of the industry rather than that of the product.

Over time, some earlier forms of a product phase out or shift from one industry to another. For significant innovations, for which the overall product life cycle is very long, the sub-cycles constituting it may be of different lengths.

The technology life cycle curve has four phases: latent development, ascent, maturity and decline. Very basic products have very long product lives, but particular technologies involved in making or servicing such products typically have shorter lives.

The technology life cycle can be regarded as having a rising potency after a point on the ascent phase; it reaches a peak at some point and declines until it ceases to have valid potency.

From a licensing and evaluating perspective, technology is most valuable during the vitality years. Earlier, the risk in acquiring the technology may be fairly high. Later, acquisition would be worthless.

2. Technology appropriateness and risk factors

The transportability of technology to developing countries is affected by other factors as well, possibly including small markets, constraints as regards raw materials, scarcity of skills and underdeveloped

Appropriateness and risk

- Appropriateness: suitability to needs, factor endowments and national infrastructures
- Risk: degree of inability to determine appropriateness

infrastructure, thus, technologies may either need to be modified or made appropriate for the new environment.

Transferring a particular technology may require that it be modified in one or more of the following ways:

- Scaling down, so that it meets the requirements of the new marketplace, mainly reduced capacity and minimum penalties for lower levels of economic efficiency
- Redesigning it to use scarce inputs in ratios that are economically rational in the new environment
- Ensuring its maintainability and its ability to be absorbed at the skill levels available (or trainable) in the new environment

The transfer of technology to an environment different from that in which it was developed entails risk, so a methodology is needed to identify and appraise technology for its acceptability.

TECHNOLOGY TRANSFER OPERATIONS
TECHNOLOGY SOURCING

- Overview
- Strategic analysis of opportunities
- Tools and methods
- Assessment (sourcing, strategy exercise)

TECHNOLOGY TRANSFER OPERATIONS
TECHNOLOGY SOURCING

Overview of technology sourcing

- Challenge to the developing countries
- Sources of information
- Strategic analysis as a sourcing tool

Challenge to the developing countries

Relative weakness in the field of information

- Infrastructure
- Internet access
- National information policy
- Geographical remoteness
- Language skills
- Interpretation skills and experience

TECHNOLOGY TRANSFER OPERATIONS
TECHNOLOGY SOURCING

Sources of information

Relative weakness in the field of information

- Governmental or multinational
- Private or trade-related
- Internet

TECHNOLOGY TRANSFER OPERATIONS
TECHNOLOGY SOURCING

Sources of information—governmental

- Governmental or multinational: most development related international organizations such as the United Nations Industrial Development Organization, the United Nations Conference on Trade and Development or the Organisation for Economic Cooperation and Development
- National governments, trade attachés
- Regional or international development banks (the African Development Bank, the Asian Development Bank and Inter-American Development Bank)
- The World Intellectual Property Organization and the World Trade Organization
- National patent offices
- European Union organizations

TECHNOLOGY TRANSFER OPERATIONS
TECHNOLOGY SOURCING

Sources of information—private or trade related

- National or international trade associations, such as the Produce Marketing Association, the Voice of the European Patent Industry, the Synthetic Organic Chemicals Manufacturers Association, the Society of Plastic Engineers and the American Chemical Society
- The Licensing Executives Society International and its national and regional chapters
- Industrial trade fairs
- Engineering companies
- Universities and academic institutions
- Consultants
- Individual networks
- Private companies

TECHNOLOGY TRANSFER OPERATIONS
TECHNOLOGY SOURCING

Sources of information—printed material

- Scientific journals
- Consultant and engineering directories
- Specialized periodicals
- Trade directories

Sources of information—Internet

Most of the previous sources can be reached on the Specialized Internet Tech Transfer databases and services:

- YET2.COM
- PLX
- PATEX

TECHNOLOGY TRANSFER OPERATIONS
TECHNOLOGY SOURCING

Strategic analysis of opportunities

- Need for a strategic approach
- Development of a strategy
- Strategic choices

The need for a strategic approach to technology choices

- Success is not random or automatic
- Need for a long-term plan
- Increasing risks and scale
- Increasing and changing basis of competition
- Increasing pace of technology change
- Increased threats and opportunities

TECHNOLOGY TRANSFER OPERATIONS
TECHNOLOGY SOURCING

Changing basis of competition

- More sources of competition
- Basis shifting from price to non-price factors (design, variety, customization, delivery, service, quality, etc.)
- Pattern of order-winning changes over time
- Need to see and hit a moving target

What is technology strategy?

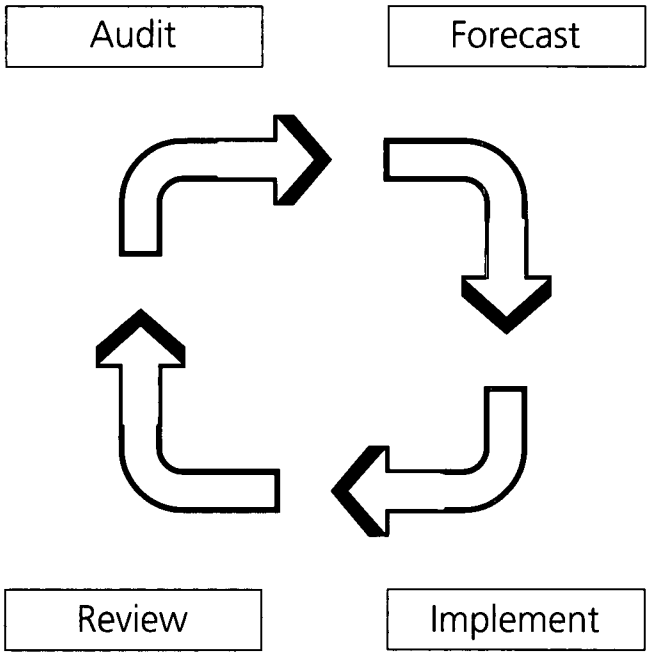
"... an understanding within a corporation manifest amongst senior management, but diffused throughout the organization—of the importance and potential of technology for its competitive position; how in the future that potential is to be realized; and how this complements the other aspects of strategy such as finance, marketing and personnel."

(Dodgson, 1990)

TECHNOLOGY TRANSFER OPERATIONS
TECHNOLOGY SOURCING

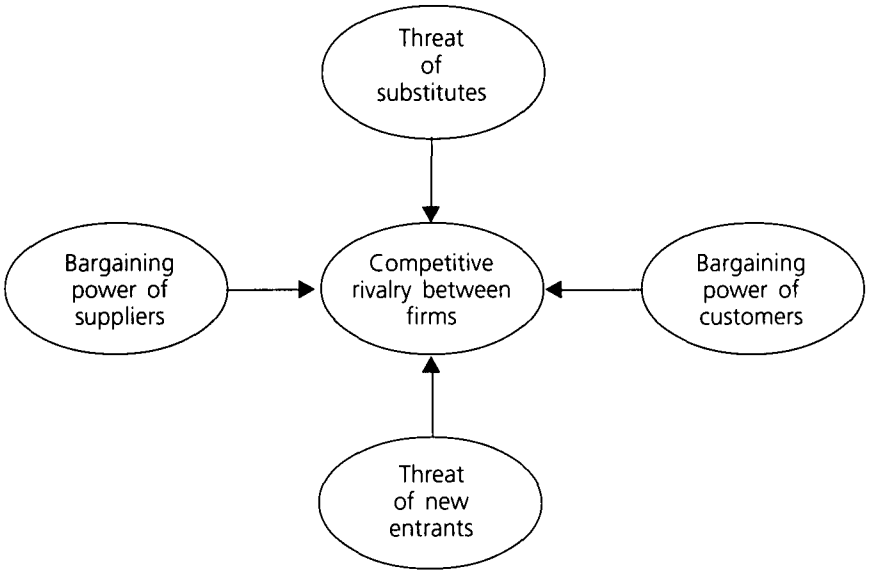
How to develop technology strategy

- Where are we now?
- Where do we want to get to?
- How do we get there?



TECHNOLOGY TRANSFER OPERATIONS
TECHNOLOGY SOURCING

The five forces model



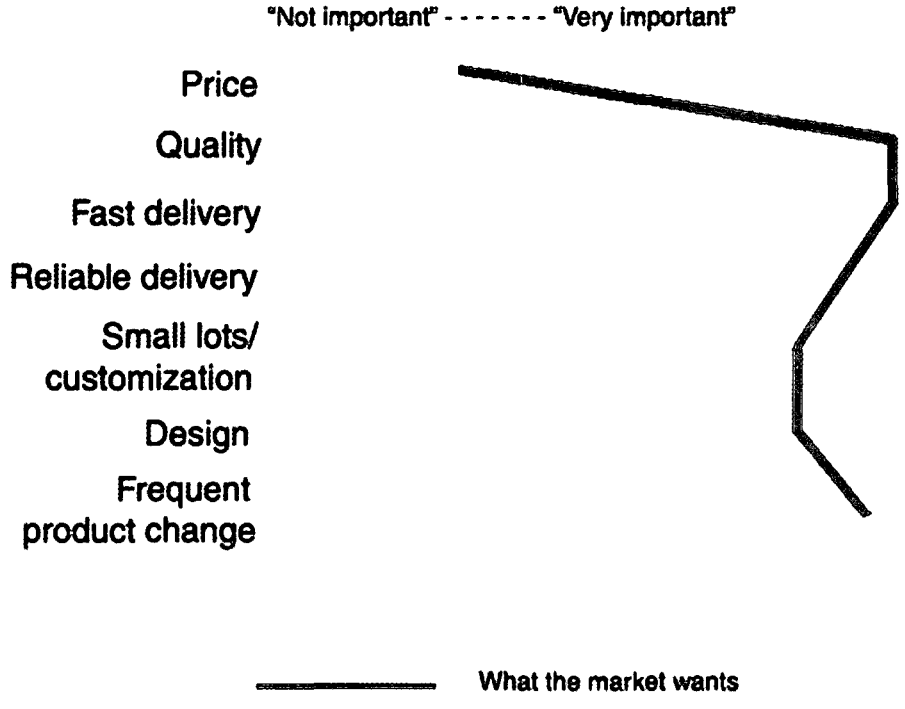
TECHNOLOGY TRANSFER OPERATIONS
TECHNOLOGY SOURCING

Competitiveness profiling

- Focus the business
- Identify other winners
- Identify market requirements
- Identify internal performance
- Benchmark the best competitor

TECHNOLOGY TRANSFER OPERATIONS
TECHNOLOGY SOURCING

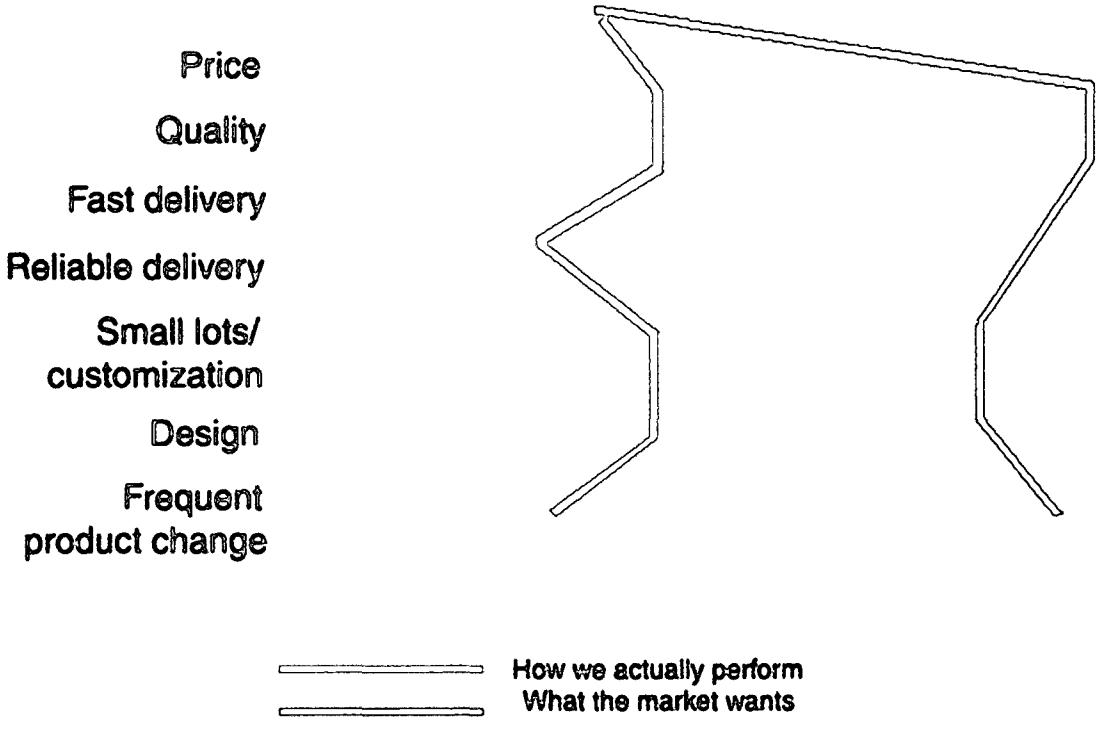
What does the market want?



TECHNOLOGY TRANSFER OPERATIONS
TECHNOLOGY SOURCING

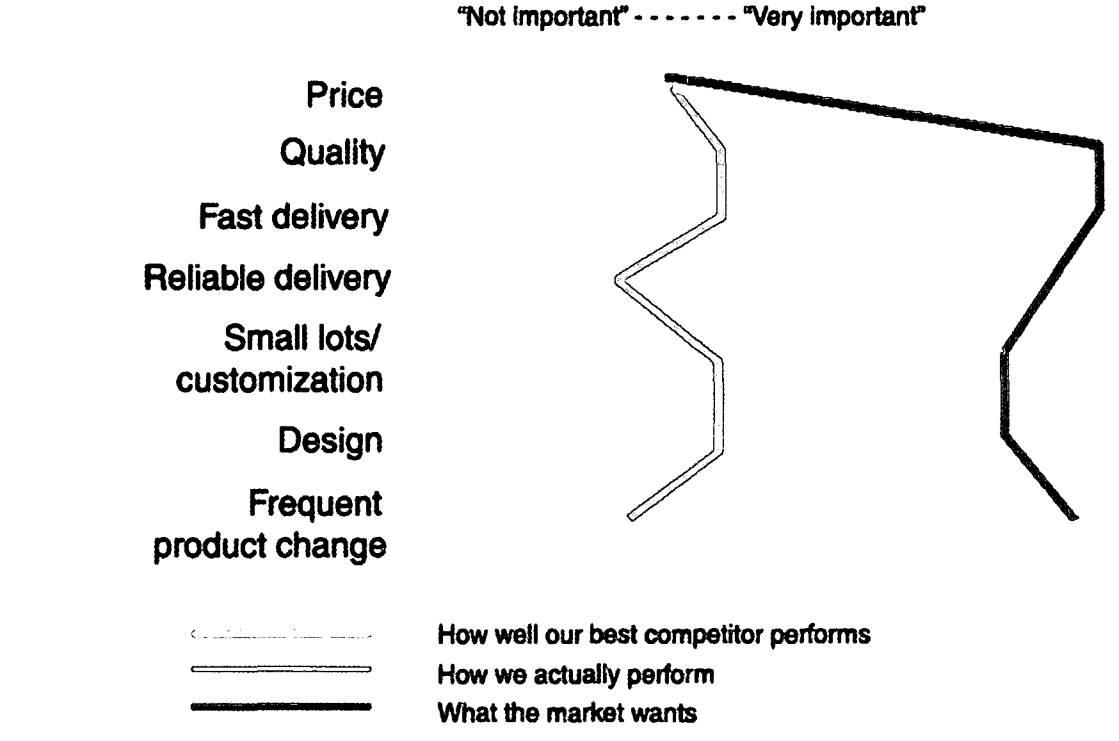
How well do we meet these demands?

"Not important" - - - - - - - "Very important"



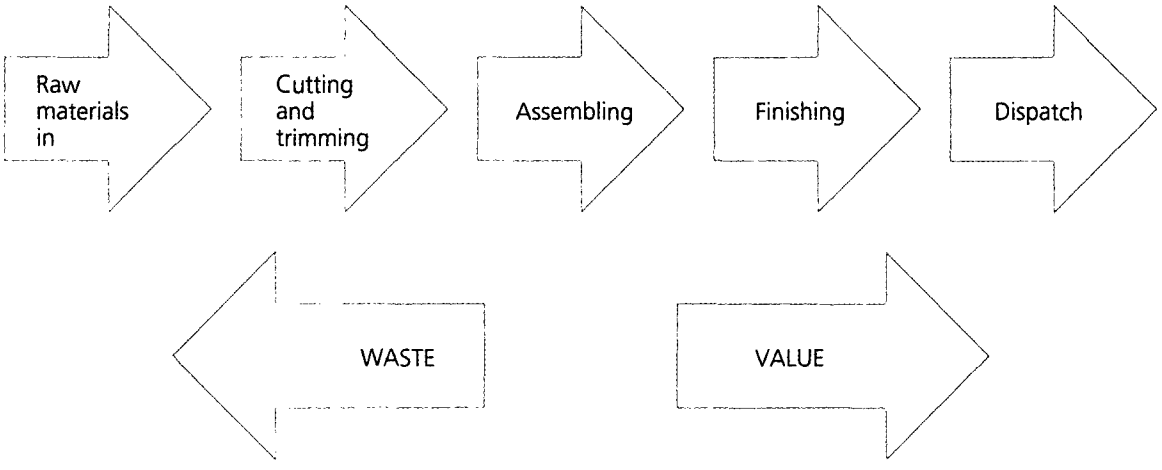
TECHNOLOGY TRANSFER OPERATIONS
TECHNOLOGY SOURCING

How well does our best competitor perform?



TECHNOLOGY TRANSFER OPERATIONS
TECHNOLOGY SOURCING

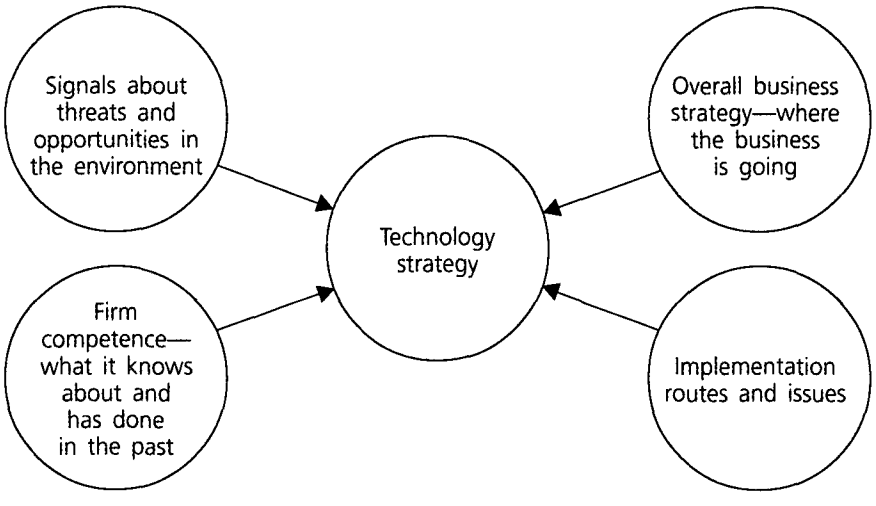
Value stream audit



TECHNOLOGY TRANSFER OPERATIONS
TECHNOLOGY SOURCING

Strategic choice

What are we going to do and why?



TECHNOLOGY TRANSFER OPERATIONS
TECHNOLOGY SOURCING

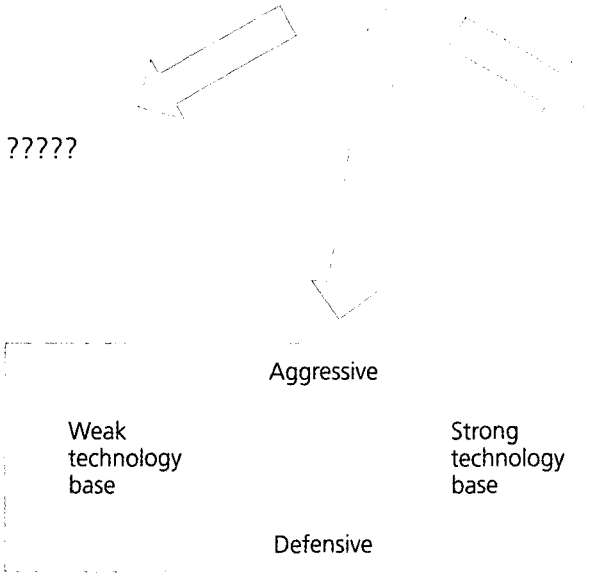
Fit with business strategy

Business strategy

- Which business are we in?
- Why?
- What forces underlie competition?
- What is/could be our competitive advantage?
- How do we compete?

TECHNOLOGY TRANSFER OPERATIONS
TECHNOLOGY SOURCING

Strategic positioning



Fireman's typology:

- **Offensive**
- **Defensive**
- **Initiative**
- **Dependent**
- **Traditional**
- **Opportunist**

TECHNOLOGY TRANSFER OPERATIONS
TECHNOLOGY SOURCING

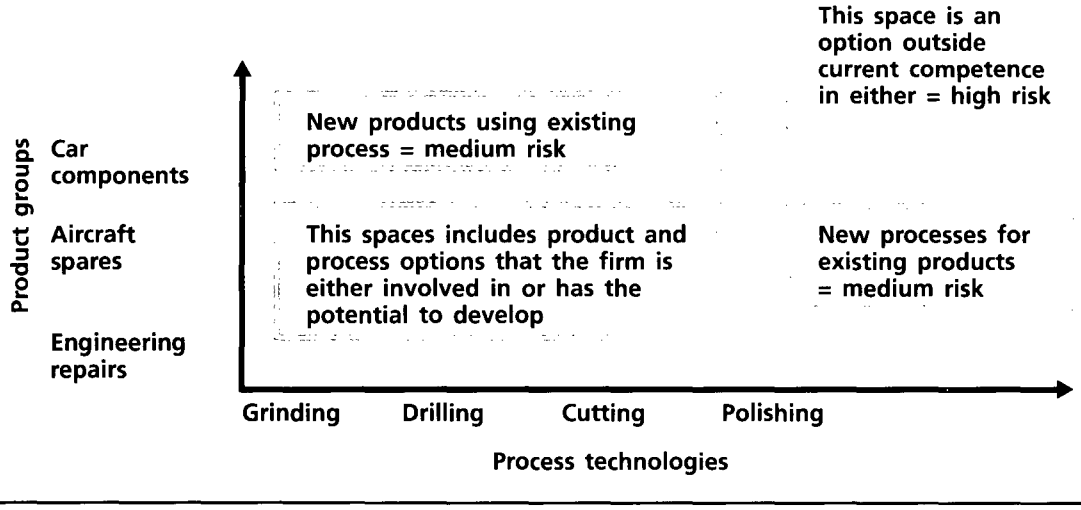
Fit with competence base

Tools for enabling strategic choice include:

- Product/process matrix
- Competence audit
- Portfolio model

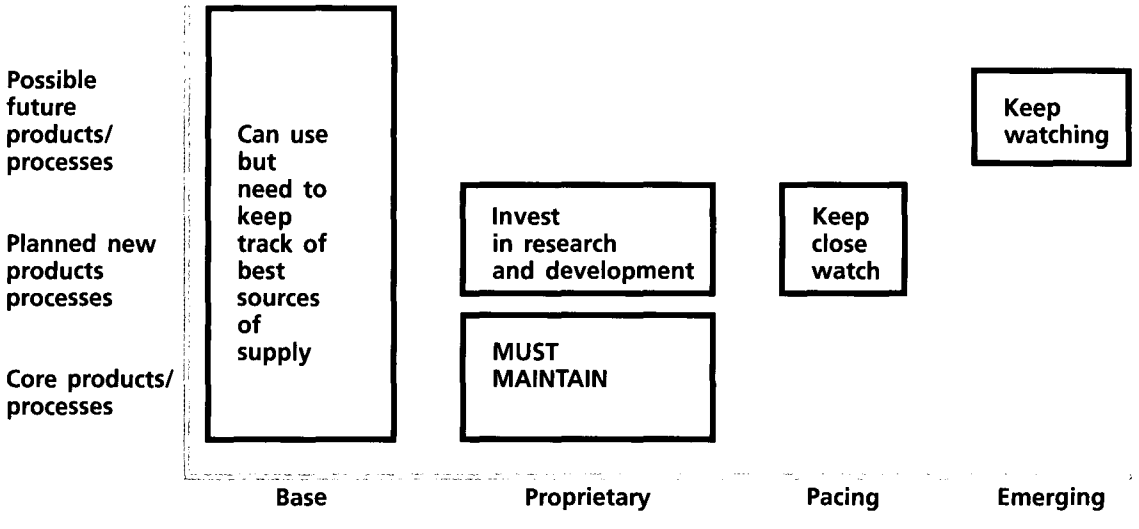
TECHNOLOGY TRANSFER OPERATIONS
TECHNOLOGY SOURCING

The product/process matrix



TECHNOLOGY TRANSFER OPERATIONS
TECHNOLOGY SOURCING

Portfolio mapping



TECHNOLOGY TRANSFER OPERATIONS
TECHNOLOGY SOURCING

Implementation issues

- Is the chosen option likely to fit with the organization?
- What can/must we do to ensure this?
- Tools to help include simulation, feasibility studies and pilot implementation

TECHNOLOGY TRANSFER OPERATIONS
TECHNOLOGY SOURCING

Priority—what do we do first?

- Identify relevant families of products/markets
- Focus business strategy questions
- Emphasize those with importance in terms of factors such as market growth, share or position in the life cycle

TECHNOLOGY TRANSFER OPERATIONS
TECHNOLOGY SOURCING

Decision matrix

	OPTIONS		
	A	B	C
Fit with strategy	***	*	*****
Fit with competence base	***	*	***
Implementation feasibility	*****	**	*
Anticipated costs	**	***	*****
Anticipated benefits	*****	**	****
Overall score/comments	*****	*	***

TECHNOLOGY TRANSFER OPERATIONS
TECHNOLOGY SOURCING

Tools and methods

Types of tool

- Analysis
- Searching
- Visualization
- Information and promotion

TECHNOLOGY TRANSFER OPERATIONS
TECHNOLOGY SOURCING

Measures incorporated

- Human resources
- Technology management
- Management of intellectual property
- Align measures with strategic goals

Measures—human resources

- Qualified staff
- Retained staff
- Training
- Performance reviews
- Objectives met against timing

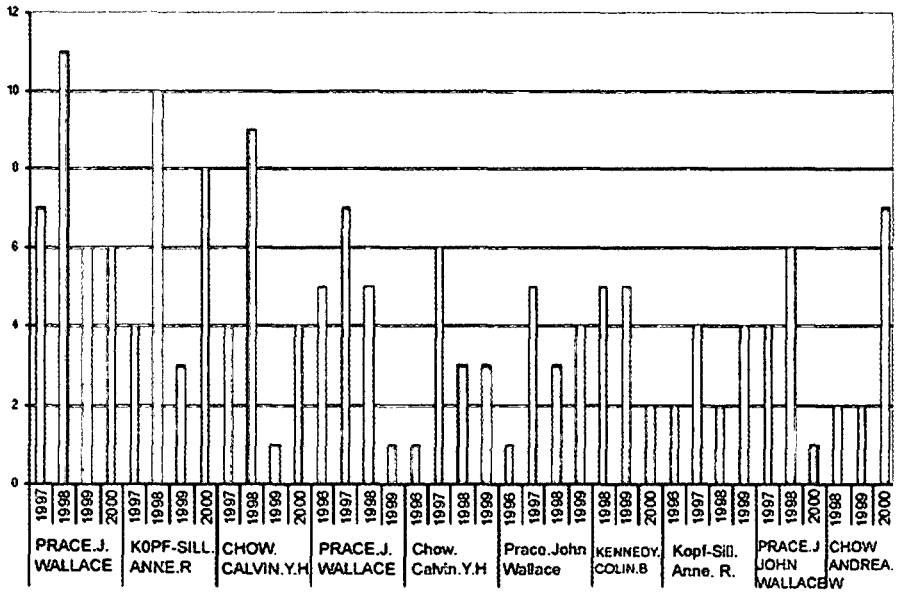
TECHNOLOGY TRANSFER OPERATIONS
TECHNOLOGY SOURCING

Measures—technology management

- Internal versus external research and development
- Return on research and development investment
- New products as a result of research and development money spent
- Invention productivity
- Age of key inventors
- Inventor concentration

TECHNOLOGY TRANSFER OPERATIONS
TECHNOLOGY SOURCING

Are these inventors still active?



TECHNOLOGY TRANSFER OPERATIONS
TECHNOLOGY SOURCING

Tools—examples

- Reverse citation analysis
- Visualization, e.g. patent mapping
- Networks
- Information databases
- Internet
- Consultants

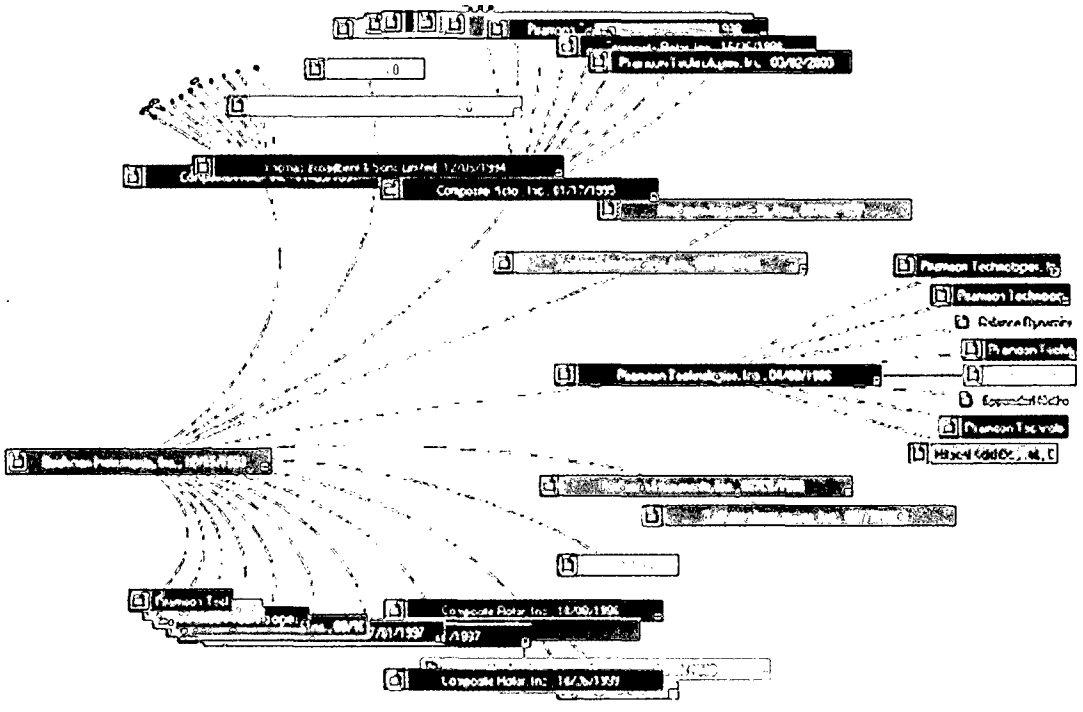
TECHNOLOGY TRANSFER OPERATIONS
TECHNOLOGY SOURCING

Citation tree

- Shows priority of art
- Shows who is developing the art
- Shows which branches are changing the fastest
- Shows which branches are withering
- Parallel technology
- Visualizes alert results
- Powerful negotiation tool

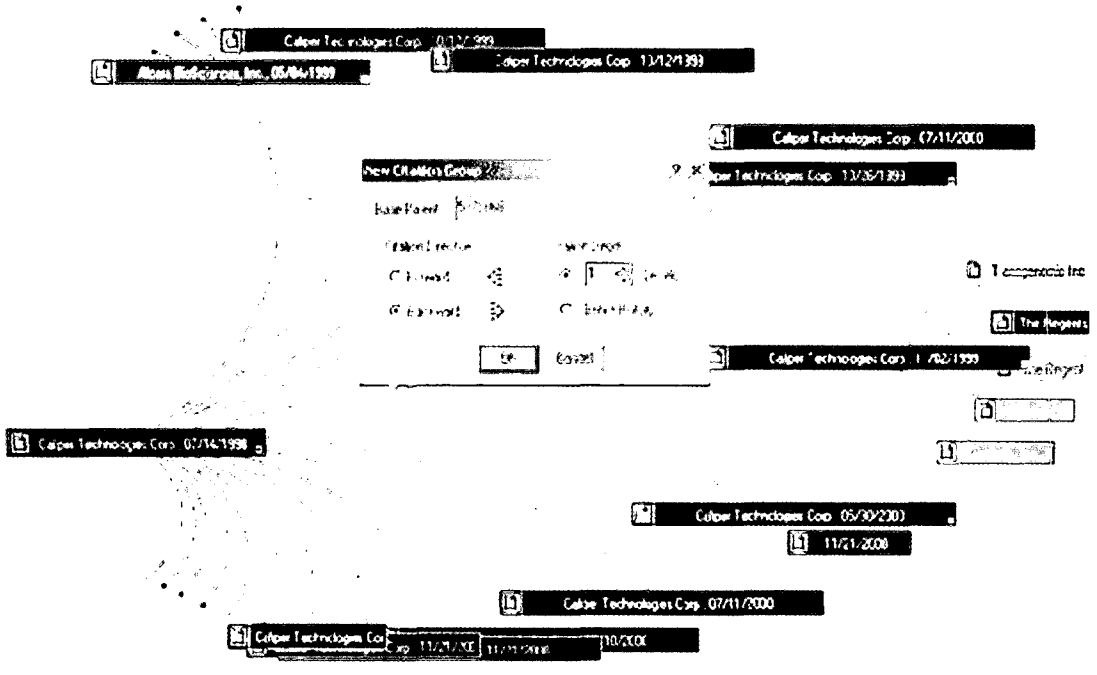
TECHNOLOGY TRANSFER OPERATIONS
TECHNOLOGY SOURCING

Analyse evolution of technology and "freedom to practise"



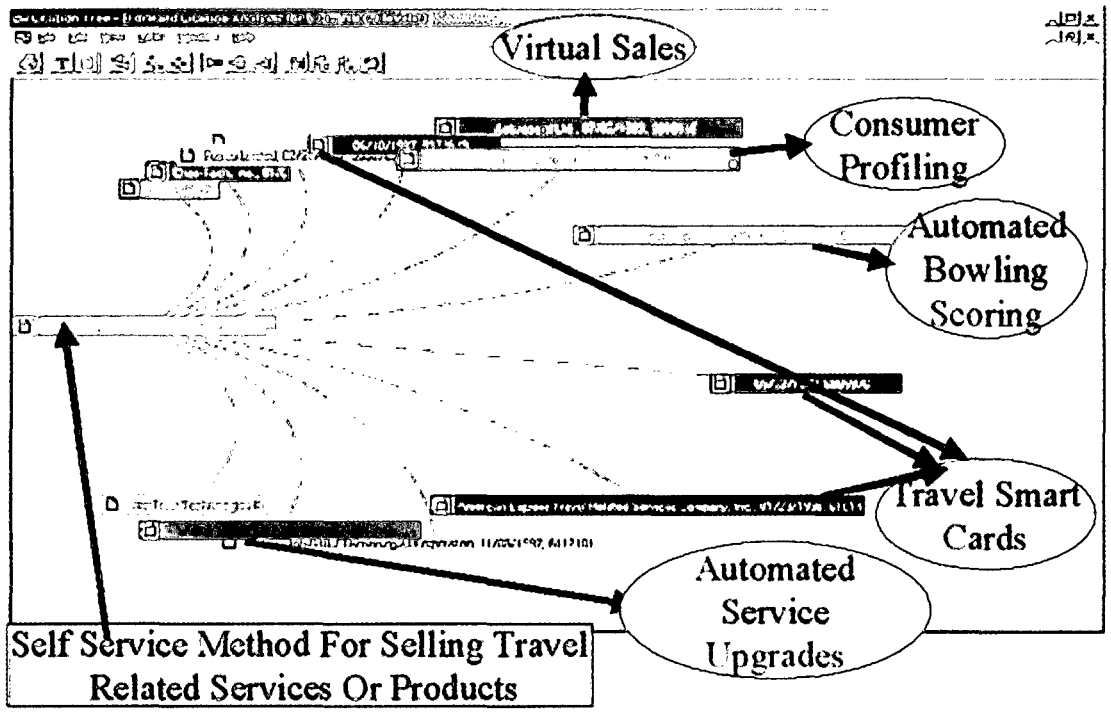
TECHNOLOGY TRANSFER OPERATIONS
TECHNOLOGY SOURCING

Quickly analyse prior art for invalidity studies



TECHNOLOGY TRANSFER OPERATIONS
TECHNOLOGY SOURCING

Citation tree of most cited patent showing evolution of idea



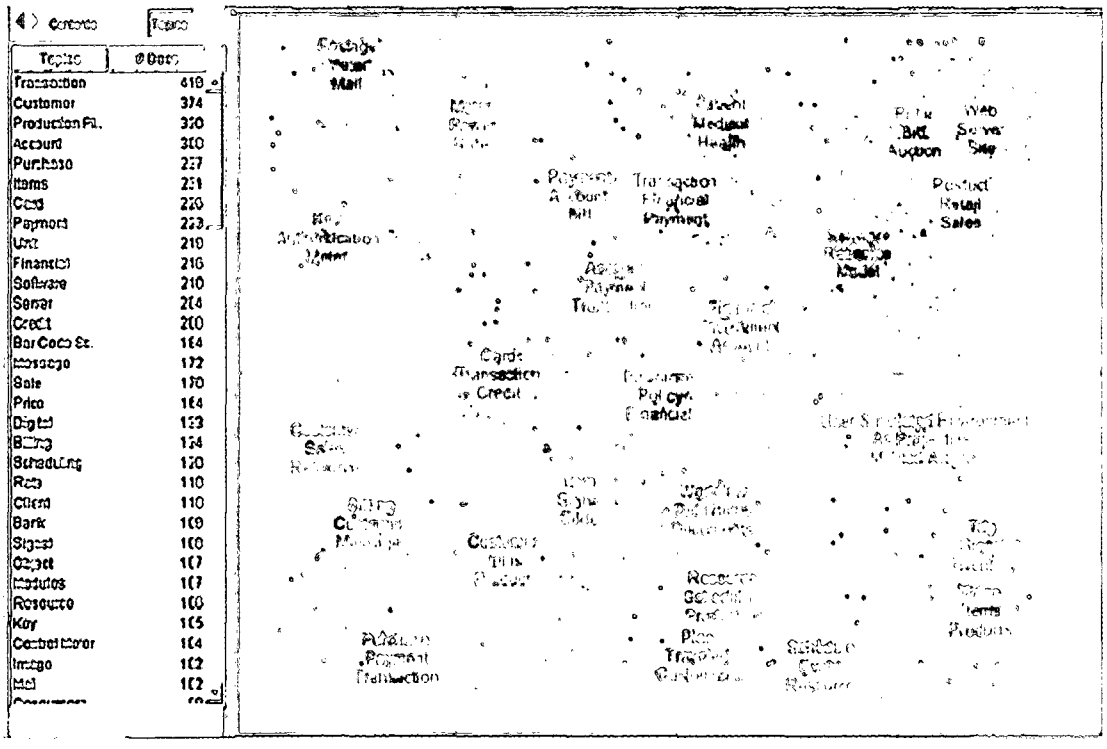
TECHNOLOGY TRANSFER OPERATIONS
TECHNOLOGY SOURCING

Integrated system: intellectual property landscape mapping tool

- Tool that statistically clusters patent documents according to their themes
- Shows landscape of patents or other intellectual assets, changes over time and changing positions of competitors
- Finds new relationships between
  - Materials
  - Process
  - Uses
  - Assignees
- Implications for white space, licences and technologies

TECHNOLOGY TRANSFER OPERATIONS
TECHNOLOGY SOURCING

Topographical landscape of 705 patent group



TECHNOLOGY TRANSFER OPERATIONS
TECHNOLOGY SOURCING

Summary

- Tools allow for the search for and importation of data from many sources
- Tools allow the user to take unstructured data and visualize information that leads to knowledge
- Many tools such as Cartia, Hyperbolic Citation and Claims Trees help facilitate this visualization:
  - Numerous report modules are available to construct tables, graphs and charts to help the analysis
  - Iteration allows for quick "what if" analysis

TECHNOLOGY TRANSFER OPERATIONS
TECHNOLOGY SOURCING

Use of Internet

- Find information
- Promote technology
- Find licence/licensor

Internet allows equalization of information

Specialized intellectual property sites

- Numerous sites
- Most prominent

  YET2.COM
  PLX
  PATEX

- Allow searching and posting of technology available for licence

Help in closing deals

TECHNOLOGY TRANSFER OPERATIONS
TECHNOLOGY SOURCING

Assessment

Importance of assessment

Poor performance of imported technologies is due to:

- Poor negotiation
- Inattention to technical/economic factors
- Poor inquiry/probing approaches
- Lack of analytical knowledge
- Preponderance of obsolescent technologies
- Required prior to contractual agreement
- Not a substitute for valuation

TECHNOLOGY TRANSFER OPERATIONS
TECHNOLOGY SOURCING

The product and technology life cycles

Product life cycle

- Involves many "cycles" of evolution but basic features persist, e.g. aircraft
- Long cycle life: 40 to 70+ years, e.g. propeller aircraft to jet aircraft

Technology life cycle

- Product life cycle comprises many technology life cycles
- High-value technology has a short life cycle, e.g. computer technologies

TECHNOLOGY TRANSFER OPERATIONS
TECHNOLOGY SOURCING

Appropriateness and risk

- Appropriateness: suitability to needs, factor endowments and national infrastructures
- Risk: degree of inability to determine appropriateness

TECHNOLOGY TRANSFER OPERATIONS
TECHNOLOGY SOURCING

The product life cycle curves

UNIDO Manual on Technology Transfer Negotiation, p. 97

The technology life cycle

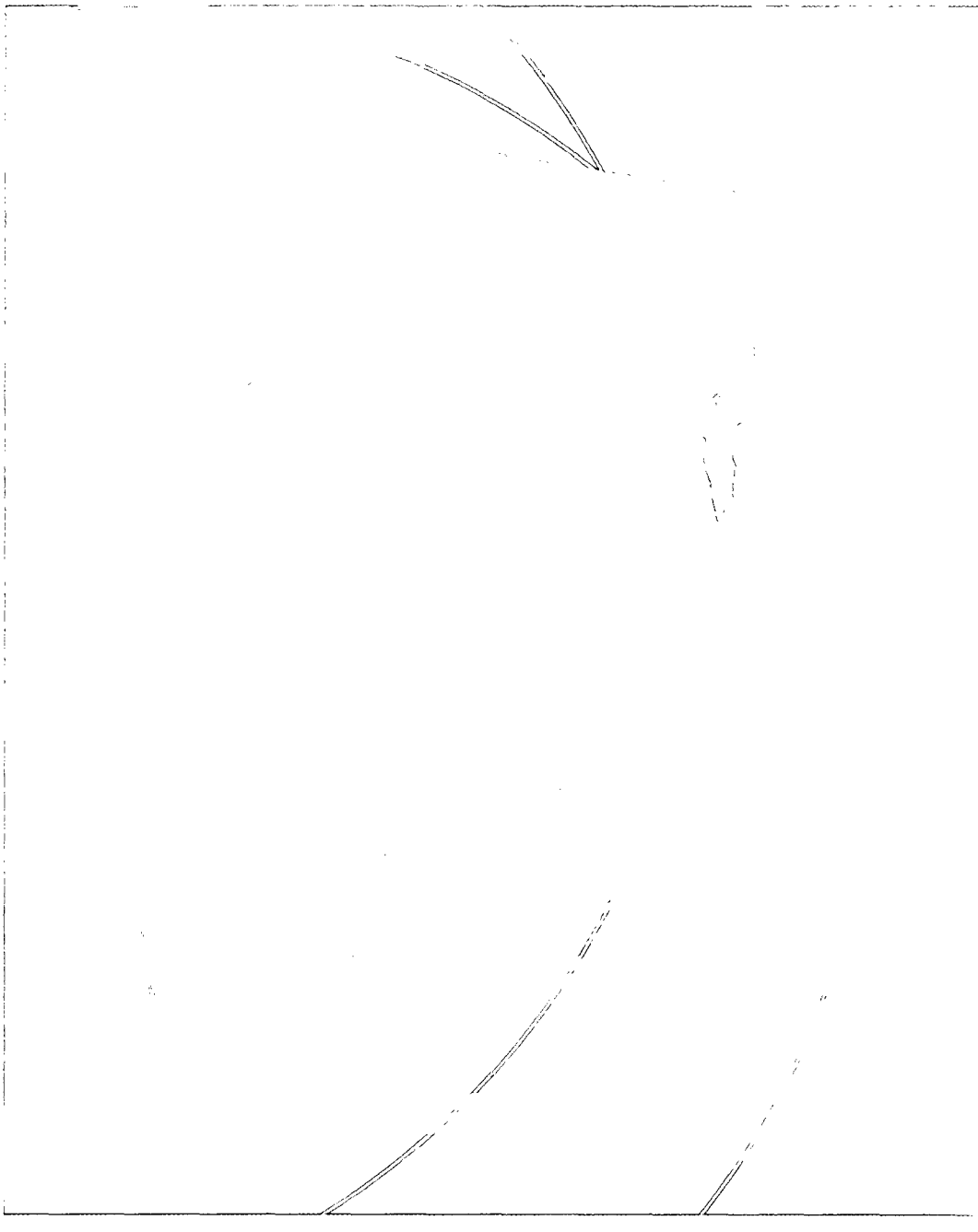
UNIDO Manual on Technology Transfer Negotiation, p. 97

TECHNOLOGY TRANSFER OPERATIONS
TECHNOLOGY SOURCING

Inappropriateness in developing country environment may be due to:

- Scaling down the size of plants
- Varying inputs or input ratios
- Changing specifications of raw materials or products
- Inappropriate infrastructure
- Design or configuration philosophy
- Sourcing and strategy exercises

IV. NEGOTIATIONS AND VALUATION



IV. NEGOTIATIONS AND VALUATION

A. Principles of negotiation

You don't get what you deserve: you get what you negotiate

Negotiations

You don't get what you deserve: you get what you negotiate

Planning and organizing negotiations

- Create an effective negotiating team
- Roles of the team leader and the members
- Lawyer as negotiator
- Evaluate the proposal—analyse the separate issues
- Develop objectives and priorities
- Prepare a conducive environment
- Recognize cultural/language differences

A negotiation is not something to be entered into lightly. It is vital to prepare correctly for it even before contacting the other party. Effective negotiating requires thorough planning and organization: planning of the desired outcome, its limits and its alternatives, and organization of the negotiating teams, their roles and their compositions. Planning will include obtaining as much information as possible about the other party or parties, independently of the technology involved.

Planning will be even more critical in negotiations of unequal power, such as between large and small entities or between parties with significant cultural or language differences.

Planning is continuous during the negotiation process. It includes an assessment of what is being learned during the negotiation and its comparison with the goals and preparation for the next steps.

Before entering into negotiations, each party needs to have a good understanding of its own negotiation parameters: needs versus wants, acceptable boundaries and the best alternative to a successful outcome.

Negotiations should be conducted in a fair and ethical manner. An agreement where one of the parties feels wronged is a doomed agreement. Parties have to learn to listen to each other for clues and input on their respective needs. Those needs have then to be compared with their own needs and desired outcome in order to close the negotiation gap quickly. Negotiation involves intent and careful listening.

If negotiations are to culminate in a successful agreement, certain prerequisites must be met before negotiations get under way.

Well before an agreement is drafted, each party needs to determine its objectives for concluding a deal. This is an elementary but necessary rule of successful negotiation. Parties often begin negotiations without being clear about the nature and scope of the contractual relationship they wish to establish, which may lead to ambiguity, misunderstanding and even distrust and bad faith between the parties as the negotiations proceed. Each party should enter a negotiation with well conceived and adequately supported goals so that the process moves ahead in an orderly manner.

B. Negotiation teams

Other than for the simplest negotiation, one or several teams need to be assembled. Typically, such teams are a preparation and planning team, a core negotiating team, a support team during the negotiations and an implementation team. Such teams are interdependent and multifunctional. One or several of the team members will belong to more than one team in order to maintain continuity. The functions represented will vary from negotiation to negotiation and from team to team.

Teams should have clear discipline and well established leadership. They should be well prepared, pos-

Planning

- Objectives
- Alternatives
- Teams

Negotiation teams

- Composition
- Team members
- Roles and responsibilities

Negotiating tactics

- First call
- Meetings
- Personnel
- Relationships

sibly through role playing. The negotiation team, in particular, should be small. It should be empowered to take decisions. Members should have well defined roles and responsibilities.

It is also critical to develop multiple options to achieve each party's objectives.

1. Composition

Composition of negotiation teams

- Preparation team
- Core negotiation team
- Support team for negotiations
- Implementation team

Team members

- Functional and negotiating role
- Discipline
- Leadership

Negotiation team roles

- Leader
- Secretary
- Observer
- Chief negotiator
- Support

The composition of teams will vary widely from team to team. As a general rule, the teams should be composed of the functional representatives needed to accomplish their tasks, but nothing more. It is better to create ad hoc support teams rather than broaden the teams.

Two initial teams need to be assembled, the planning team and the negotiating team. The team that does the planning for the negotiation should consist of, at a minimum, the chief negotiator, a technical expert, a financial expert and a legal expert. If it is a complex deal, engineering, manufacturing and marketing personnel may also need to be involved. At times, an outside consultant will be beneficial. It is the planning team's responsibility to set all of the parameters for the proposed agreement so that the negotiating team has the information it needs to properly present its case to the other party.

The actual negotiating team for technology transfer agreements should be kept as small as possible. A simple patent or patent and know-how licence may require only one person from each party, the licensing executive for each. As the complexity of the type of agreement being sought increases, the team is expanded. Many complex technology transfer agreements are handled by the licensing executive and an intellectual property (IP) attorney.

All too often, a negotiating team is appointed just as formal negotiations are about to begin, so the team goes to the table without adequate opportunity to study the proposed transaction and back-up information in depth or to have an input into the positions that the chief negotiator will present during the negotiations. Obviously, the last-minute appointment of members of the negotiating team is an unwise practice that should be avoided.

The role of the *team leader* is a special one. He or she should be someone who can command the respect of the other players and who is articulate and patient. Team leaders must have the character and strength to be able to control a meeting and win the respect of their own and of the other party's representatives. They must have self-confidence, be able to lead and have the support of superiors. They must also

understand the subject, be broad-minded enough to listen to opinions different from their own and appreciate such arguments—and not be offended when someone contradicts them. They must be able to make decisions when needed.

The *chief negotiator* should be the person best able to deal with the particular negotiation. An understanding of the culture of the other party's country, the language in which the negotiations are to be held and the culture of the company itself are decided advantages.

The *secretary* acts as note keeper during the negotiations. He or she keeps track of the agenda, notes all exchanges of information and keeps a record of points of agreement, points of contention and concessions made.

The *technical expert* should know the technology and must understand the technical advantages and disadvantages of what is being offered. He or she must have knowledge of alternative technologies to those in the proposal and their cost. If at all possible, the technical expert should be drawn from the technical group in the planning team that analysed the original proposal.

The *financial expert* should be familiar with various types of financial arrangement, including potential sources and terms of both domestic and international financing. He or she should also be able to calculate the long-term impact of changes of the financing being discussed, as well as the long-term financial returns and cash flows from the transaction as it is modified during the course of negotiation.

The *legal expert* should have experience in drafting contracts and should be knowledgeable about the terms and conditions of technology transfer agreements. His or her main duty is to structure the agreement and its specific provisions so that they reflect what the parties have agreed to orally. He or she must also watch for terms and conditions unfavourable to his or her side and must be able to detect subtle provisions that may escape the eye of the business licensing executive.

The responsibility of the *observer* is to watch for clues about the other party, notice reactions to statements, body language and any information that may help the chief negotiator or the team leader. It is unwise to combine the role of secretary with that of observer.

Some of the roles described above can be combined according to the complexity of the deal and the skills of the team members.

2. Team discipline

A negotiating team should speak with one voice. The lead negotiator is the main spokesperson. Other members should speak only when the principal spokesperson invites them to do so, which should be done as frequently as possible to maintain team alertness and spirit.

Experienced negotiators make a point of looking for any disagreement between the members of an opposing negotiating team and exploiting it to their advantage. Obviously, open disagreements between team members must be avoided, as should disagreements conveyed by facial expressions and body language.

It becomes crucial, therefore, that team members maintain a calm demeanor in the negotiating room. They should avoid revealing any difference of opinion with what the chief negotiator is saying. If the issue being discussed is of sufficient importance and the disagreement is substantial, the chief negotiator should be asked to call a recess so the issue can be discussed and an acceptable position agreed before returning to the negotiating room.

Team meetings should be held before each negotiating session to go over the points to be discussed and to agree on their handling. Similar meetings at the end of each session to review the points agreed upon and their general impact on the overall progress of the negotiations will go a long way towards limiting the chance of disagreement during the actual negotiations. In such meetings, team members should advise and assist the lead negotiator by analysing the arguments presented by the other side, finding their

weak points, studying their implications and generally providing the chief negotiator with appropriate counter-arguments.

Another way to look at team members is to look at functions that need to be accomplished during the negotiation process: leader, secretary, observer, chief negotiator and support. Each one of the tasks is needed, but several may be carried out by the same individual. The least understood is the function of observer. That role is extremely important, as this person will feed the team with important information about the other party.

C. Negotiation strategies

Negotiation is an interactive process that suffers if time constraints are imposed arbitrarily. Refrain from setting deadlines unless they are needed. It is important, nevertheless, that progress is made according to a realistic time line.

The length of a negotiation is always more than expected. Patience is critical. Use time to advantage and take time outs to work with the team and think through the options. It is important that the issue of how to request for time out between team members has been discussed in advance.

Team preparation

- Role playing
- Familiarity with the issues
- Tactical issues
- Operational items

Negotiation time frames

- Iterative process
- Longer than planned
- Use time-outs and silences

Negotiating styles

- Know the people
- Strategy and tactics
- Transactions versus relationships
- Win-win = good relationships

Successful negotiations depend on knowing the style and background of the people being dealt with. Time needs to be allowed to learn about it. The same applies to their corporate or national culture.

Strategy and tactics must be separated from each other. Learn to use both appropriately.

Licensing is a long-term relationship so it is important to end up with an agreement that reinforces the relationship.

It is also important to try to address the business issues first. If a deal makes good business sense, pricing will become a secondary issue. Set up the financial conditions clearly and fairly, including when payments are due and for what.

Negotiation is about trade off. Tabs should be kept and the implications understood for all concessions and trade offs, financial or not.

1. Preparing for negotiations

Once the negotiating team has been appointed, it should start preparing for formal negotiations with the other party. This requires focusing on its own and on the other party's key information, objectives and issues. Doing so before the start of formal negotiations compels the team to reflect in-depth on each issue and prevents it from being caught by surprise later or being forced to improvise positions.

(a) *Develop key information*

Key information on a range of issues needs to be gathered and assessed before the negotiations begin. Those issues include the technical aspects of the proposed transaction, such as the nature of the technological product or process being proposed and alternatives thereto; the type of equipment required, the raw materials and utilities needed, the material flow and production specifications and technical assistance requirements.

Issues also include financial aspects such as estimated production and capital cost, potential profit-

ability and return on investment. With respect to a technology licence, the team needs to determine proper royalties, territory, exclusivity, field of use and the many other important aspects of a technology transfer agreement.

(b) *Defining key objectives*

Adequate preparation requires the negotiating team to determine how their technical and economic objectives can be optimized without making the agreement unduly one-sided. Once the objectives have been identified and agreed to, the negotiating team should list the key issues to be negotiated and try to avoid establishing fixed positions on those issues.

(c) *Information about the other party*

The importance of learning everything possible about the other party cannot be overstated. Information on its financial position may be obtained initially from the party itself. It can then be verified and supplemented with information from many other sources. If the other party is a publicly traded company, extensive financial information can be obtained from annual and quarterly filings with national regulatory agencies. If the other party is privately owned, information can also be obtained from large banks and credit agencies.

Information on the experience and prior performance of the other party in similar technology transfer projects is more difficult to obtain. Again, the negotiating team should request such information from the other party and then check it out through other sources.

(d) *Objectives of the other party*

Acquiring background information about the other party may give the negotiating team a good idea of the other party's objectives, priorities and concerns.

Such information will enable it to formulate better negotiating strategies. Addressing the other party's concerns early in the negotiations with proposals designed to satisfy interests on both sides would greatly facilitate a mutually satisfactory agreement.

2. Negotiation tactics

Considerations

- Business
- Financial
- Trade offs

Deal memo

- Licence terms
- Sub-licence
- Field restrictions
- Reserved rights
- Payments

It is immaterial who makes the first call. It depends more on the motivation of each party. What is important is the management level to approach, as well as determining the business function (research and development, legal, business, licensing). The first meeting, in general, is to decide if there is enough substance for a deal to take place. If possible, the location should be neutral. The major item on the first meeting's agenda should be to get to know each other better.

Multiple functions will be involved during the deal.

Also, make sure the prior and existing relationships between the parties and the participants involved are understood.

3. Organizational aspects of negotiations

In arranging negotiating sessions, a number of organizational aspects need to be considered.

(a) *Physical arrangements*

The physical and psychological state of the negotiators during negotiating sessions frequently affects the dynamics of the negotiation process and can in turn be affected by the physical arrangements outside and inside the negotiating room.

If the outside physical arrangements are inadequate, or even unfamiliar, negotiators become uncomfortable and uneasy, which may lead to impatience and irritability. Such a state of mind makes the search for compromise solutions and eventual agreement more difficult.

Similarly, being substantially outnumbered by the opposing negotiators or being forced to negotiate in too small a room for long hours also makes negotiators uncomfortable and irritable and detracts from the dynamics of the negotiation process.

Some negotiators like to use physical arrangements as part of their tactics, believing that discomfort, impatience and irritation will induce negotiators to concede on issues where they might otherwise have staunchly resisted. Such arrangements should be looked for and if they are troublesome, it should be tactfully requested that changes be made.

(b) *Meeting length and frequency*

As in the case of physical arrangements, the length and frequency of meetings can affect the state of mind of the negotiators and either speed up or delay arriving at agreement.

The first-stage negotiation of a given agreement should bring to the surface all the issues. Once they are all known, it is easier for each party to determine how much time will be needed to study them and when a new meeting date can be set for their resolution.

(c) *Informal meetings*

Informal meetings are highly recommended. In such settings, members of the respective teams get to know one another better and have the chance to develop personal relationships that will facilitate communication and understanding between them. Business should not be discussed at such meetings: they should be kept informal. Team discipline must preclude "side discussions" of issues by team members other than the chief negotiator in informal meetings.

4. Closing the deal

Deal memo

- Diligence terms
- Confidentiality
- Warranty
- Indemnification
- Improvements

Closing the deal

- Review terms
- Communication
- Focus and plan
- Reporting/record-keeping

When the negotiation is completed, it is recorded in a "deal memo" also called a "term sheet" or "points of understanding". That memo will include at a minimum the licence terms, the sub-licence rights and how to handle them, the field of use restrictions, the reserved rights for others and licensor and the payments (amounts, types, times, etc.). It will also include diligence terms for both sides, confidentiality provisions, explicit warranties or disclaimers thereof, indemnifications and the rights to improvements (those made by the licensee and those made by the licensor), as well as terminal rights.

Upon closing the deal, make sure the terms are reviewed and agreed upon by all decision makers and stakeholders in a timely manner. Communicate to all involved or to those who will feel the impact of the progress of negotiations and the final terms. Develop a concrete plan for the implementation of the agreement and if necessary appoint an implementation team to carry it out. Create a system to follow the agreement, in particular if continuous payments are due or if specific tasks will need to be carried out over time.

All parties should feel as though they gained something from the deal. Reaching and signing an agreement is usually only the beginning of a relationship, which will need nurturing and care.

5. Potential problems

During the negotiation process, watch for specific danger signs, such as when delays to implement agreed tasks becyome the rule rather than the exception, team members frequently change for no apparent reason, new potential partners appear from nowhere or there are major changes in either party's management or strategy. Recognize those signs early in order to establish "walk-away" conditions. Make sure that, if such a measure is required, it is done in a professional and courteous manner. It may be needed in the next negotiation.

6. Negotiation techniques

The technology transfer relationship

- Structure of the relationship
- Legitimate interests of the parties
- Win-win approach
- Proposal-making
- Contract sets down what is negotiated

Negotiating techniques

- Structure the negotiations
- Defer difficult issues
- Take up general positions before specific
- Use committees and support groups
- Keep score of concessions: the two-way street argument
- For difficult issues, "peel the onion"

- Defer difficult issues. Create a momentum of agreement right from the start. Probably the most useful technique for advancing the process of reaching agreement is to defer those issues which appear most difficult to resolve and tackle those which can be settled quickly. Experience has shown that a series of agreements on lesser issues creates a momentum that induces negotiators to reach agreement on difficult issues. The agenda for the negotiations should therefore be set so that issues with likely positive outcome are discussed first and difficult issues are set aside for later.

- Take up general propositions before specific ones; agree on the principle before the specific language. It is frequently easier to agree on a general proposition than a specific one whose impact is more transparent. Similarly, agreement on a principle is often more easily obtainable than agreement on the specific language that applies to a principle facet of the transaction, postponing the more difficult phase of the negotiations to a later stage.

- Use committees to resolve difficult issues. Initial discussions may reveal that certain issues will be difficult to resolve and may require alternative means of resolution. Formal negotiating sessions may not be the best setting for exploring possible solutions. It may be more effective to set up a special task force in which members familiar with the problem explore the different solutions and report back on them to the negotiating teams for decision-making.

- Keep score of concessions. It is advisable to keep a record of all concessions made. Such records prove willingness to compromise and may help obtain concessions later on in the negotiations.

- Use the two-way street argument. Proposals are often advanced that may be difficult to oppose because they appear reasonable, although they may have objectionable long-term implications. One technique to counter or accommodate such proposals is to agree to the proposal provided the proposing party agrees to concede equivalent conditions. If the proposal has long-term objectionable implications, the proposing party will very likely withdraw it. Occasions for use of the two-way street technique come up often. It is useful to keep it in mind, as its reciprocal logic makes it compelling.

- Peel the onion. Negotiators occasionally face issues, the resolution of which requires a concession by the other party so large that there is little chance of obtaining it. A technique that experi-

enced negotiators often use in such cases is to break the issue down into its various layers and resolve topic after topic.

- Structure the negotiations. It is recommended to list all concerns and issues before negotiating any one of them. That would preclude conceding a point early in the session and then regretting it later, when a fresh issue is raised.

7. Tactics

- Bad guy/good guy. Such a tactic creates a "bad guy", who does not want to yield on any issue and who proposes unacceptable demands and a "good guy", who makes reasonable proposals and acts in a moderate way. The "reasonable" proposals of the "good guy" may also be unreasonable.

- Divide and rule. Such a ploy selects one opposing member whose views are more acceptable than those of the opposing team leader. The selected member is then played up to and treated as a reasonable person. The aim of such a ploy is to provoke a division in the opposing ranks.

- Trial balloon, red herring, straw man. All are variations of the same tactic: arguments may be presented not because they are believed, but simply to obtain information, or to instil a false sense of confidence with respect to the other party. These three tactics also have a legitimate use in negotiation to try to break logjams or to resolve difficult issues, but should be presented as such.

Negotiating tactics

- Create "good guy", "bad guy"
- Divide and rule!
- "Trial balloon", "straw man", "what ifs"
- Threatening a walkout, ultimatums
- Beware of "standard terms", "standard contract", "government rules"
- Set the precedent

- Threatening a walkout. Threatening to terminate the negotiations is a tactic often used to gain an important concession. It can be successful if it appears the other party is under pressure to obtain the agreement being negotiated, but it can only be used seldom. The tactic needs to be used very judiciously and only where the issue is sufficiently crucial that the party making the threat will not hesitate, if the point is not conceded, to carry it out.

- Last-minute demands. Last-minute demands are generally made after negotiations have been completed and the negotiators are under the impression that they now have completed their work. The tactic is used in the belief that the pressure to accede to such a demand may be irresistible.

- Standard terms, national practice, setting a precedent. A tactic commonly used to obtain favourable terms being presented as standards are in line with, and/or required by national law or practice. Such a tactic may have merit if it can be independently verified.

D. Intercultural negotiations

Intercultural negotiations are more often difficult to conduct. On top of the normal obstacles, relationship-building is made more difficult by differences in nationality, culture, race, gender and language. Similar difficulties may occur in negotiations between two entities of vastly different corporate culture, such as between universities and large corporations or between small and large entities. In such a case, special care should be taken to understand how the parties expect the negotiation process to evolve and to prepare for it.

When more than one language is used, or when uneven knowledge of the negotiation language is apparent, extra time and care is needed. The use of interpreters should be carefully controlled; their role has to be restricted to interpreting only. Each party should hire its own interpreter.

Intercultural negotiations

- Nationality
- Culture
- Race and gender
- Language
- Corporate culture

Interpreters and negotiators should be instructed to take "small bites". Nothing is more frustrating to the teams than to listen to a lengthy dissertation and it then being translated in a few sentences. It is also critical to replay frequently what was said to make sure it was understood correctly. Always avoid use of colloquialisms that cannot be easily translated or understood.

As general principles, it is advisable to do your homework, be fair and be creative.

E. Valuation methods

1. Why and what

One of the most critical and complex issues to be negotiated between a prospective licensor (transferor) of technology and a potential licensee (transferee) is the "price" of the technology.

The question of technology price has to be reviewed in the context of the technology market. Thus, before taking up the price of technology, there is a need to appreciate the general differences between market operations in the technology environment and other forms of commercial transactions.

Valuation

- Payment for what?
- Quality of technology acquired
- Remuneration versus profitability
- Royalties as a profit-sharing device
- Assessing remuneration
- Payment modes and alternatives
- Determination of value

In particular, the following distinctions need to be made:

- In the normal practice of commerce, several and competing sources of supply are encountered, complemented by a larger number of buyers. By contrast, the technology market, on the whole, contains relatively few sellers and buyers and there is only limited advertising of technologies available or sought.

- In commodity markets, there is most often outright sale and acquisition of the commodity (that is, outright and unconditional transfer) and a determinable market price for products. In contrast, in technology markets, the technology is often offered and accepted on "licence" (akin to a lease); the transactions may thus involve lease payment or rent, information regarding which is not made public.

The price of technology has to be viewed from the perspectives of the licensor and the licensee. Different terminology also applies in technology pricing. The most frequently used terms include "royalties", "franchise fees" and "technical services fees".

From the point of view of the technology owner, technology needs to be priced in the context of its value. For parties interested in acquiring technology, licensing represents a quicker, less risky and less expensive means of acquisition than attempting to develop an equivalent competitive technology. A licence is not worthwhile unless the return from its usage: *(a)* is higher than the cost of obtaining it; and *(b)* is commensurate with or superior to the returns obtainable through alternative competing investments.

2. Royalties and payments

Two important principles need to be remembered when establishing royalty payments based on technology valuation:

- All royalty payments represent a sharing of the potential profits of the licensee with the licensor based on assessment of relative risks
- All payment schedules can be reduced to a single equivalent payment at a given time

Technical fees

- Fees are related to the quality of the efforts to be made: skill level x time factor of effort
- International rates prevail for different qualities of service
- Issues of "one time" and long-term services

Assessing royalties

Two important principles:

1. All royalty payments represent a sharing of the licensee's profit between the licensee enterprise and the licensor on relative risk
2. All forms of payment can be reduced to a single equivalent payment for comparison and computation

(a) *The technology life cycle*

The technology life cycle (TLC) can be visualized as consisting of four rather clear phases:

- The development phase, during which no profit accrues from the development of the technology
- The growth phase, showing the ascending path of successful technologies, with the slope defining the level of success
- The saturation phase, which is often seen as the phase of established, tested technologies; the flatness of the curve can be short or long, depending on competitive forces
- The decline and decay phase: the technology loses momentum of its own accord (for instance, when patent protection expires), and also as a result of emerging, imitative and displacing technologies

Royalties and the technology life cycle I

- Ascendant phase:
  - Highly profitable technologies
  - High risks (from competitive developments)
  - Reasonably high-cost technology
  - Short duration of the high profitability period
- Mature phase:
  - Low risk in large markets
  - High-cost, low-risk technology
  - "Commodity product"-like returns
  - Fairly long duration of the profitability level

The implications of TLC for a firm interested in acquiring the technology in question are several. When a technology is in the growth phase, its licensing is expensive, as the proprietor-licensor would price the technology to recover a large proportion of its development cost and future potential benefits. Strategic alliances and cross-licensing typically involve such cost and benefit sharing. Some of the newly industrializing countries also license-in technology at such a phase to leapfrog conventional development.

Royalties and the technology life cycle II

- Decline phase:
  - Riskier than in the mature phase
  - Low-cost technology
  - Low returns
  - Decline period variable
- "Technique phase" of the technology life cycle
  - Down-scalable technology, easy absorption
  - Low risk, low returns
  - Technology cost = skill costs

Licensing technology during the saturation phase of the technology life cycle is more common. There is little risk of technology failure. The technology would be priced to give the licensee a level of return not much different from the return from a stable similar business. Licensing in such a phase can be particularly attractive to a prospective licensee when the local situation permits the products of the technology, which are not otherwise available, to command a price premium.

(b) *The concept of remuneration*

Remuneration is the most general term for the payments made or received in technology transfer. It includes money and payment in kind.

A crucial term in technology transfer is "consideration". For legal exactness and enforceability, remuneration paid or received must be for a consideration. Such a consideration may be the rights granted through a licence, services performed by an engineering firm under a contract or advice given by a consultancy organization through an agreement. A remuneration that is not associated with a consideration is ambiguous.

The focus on consideration permits an important distinction to be made between remuneration received (or paid) for the performance of services and that received (or paid) for the grant of rights and legal privileges.

(c) *Remuneration in technical service agreements*

Of the two types of remuneration, the easier to handle is that paid or received for technical, engineering, construction, consultancy and related services. Such services are performed by professionals, acting in their own right or through an organization with expertise in providing such services. As part of the technology transfer process, such services lead to efficient production and are important to the business success of the recipient organization.

Technical services can be rendered over a period of time. The consideration is the technical components of the service, the substantive element of which should normally be listed in the agreement.

(d) *Remuneration in licence agreements*

Remuneration in a licence agreement relates to the rights granted to a recipient enterprise by the owner of such rights, usually called intellectual property rights. The latter include patents, trademarks, copyright and know-how (knowledge and experience held privately).

Patents and copyrights have a fixed lifespan after which they enter the public domain and cannot command a value or price. Trademarks have a perpetual life, provided their registration is kept in force through periodic renewal with national statutory bodies. Know-how is best defined as a trade secret. Know-how is often the most important element to licensees. When properly defined in an agreement, it can be viewed as a right conferred to its proprietor and, therefore, valuable intellectual property.

In contrast to technical services, remuneration for intellectual property rights is determined in terms of any business advantage that might accrue to the acquirer of the rights. The acquirer of rights obtains a licence to the rights: the right to use, make or sell. Through provisions, the owner (or licensor) can limit the rights of the acquirer (or licensee) in the grants clause of the licence. For example, a non-exclusive grant under patent rights is a limitation on the right to use patented technology since it provides the right for a third party to operate in the same territory under the same patents.

The consideration in the licence agreement is, therefore, the set of grants awarded and obtained on licence. Remuneration must be tied explicitly to the technology as expressed through patent, know-how, trademarks and copyrights as packaged in the negotiation process.

(e) *The concept of royalty*

In licensing intellectual property rights, there is no market price for the "product", as the product can

range from intangible right-to-use trademarks to highly tangible right-to-use substantive knowledge encompassed in know-how.

The word "royalty" probably has its origin in the royal franchise given by the Crown to individuals or corporations for the exploitation of foreign territories or national resources, such as minerals. The franchisee paid a royalty, or share of the proceeds, to the Crown for the advantage derived from the royal concession; at the same time, the royalty was a token of the grantee's express acceptance of the Crown's continued sovereignty over the territory or resource or property. That general concept has been carried over to the field of intellectual property rights.

(f) *The assessment of remuneration*

The variety of forms in which remuneration is expressed in technology transactions can be quite complex. Besides a running royalty, which may be on sales or unit product produced or value-added, there is lump sum royalty and several types of down payment royalty fee combined with a running royalty.

It is important to consider clearly the forms of expressing royalty, the royalty basis and the terms and conditions of payment when deciding on payments.

When those are effectively dealt with, the possibilities of conflict during performance of the agreement are reduced.

The factors determining how compensation is expressed in an agreement are the same as the factors determining how the technology is valued and how the income is to be shared:

- Product(s) or process(es) covered by the technology
- Size and sales potential of the assigned territory
- Complexity of the technology and the technological complexity of the recipient industry or host country environment
- Technology elements being licensed (patents, trademarks, etc.)
- Export rights, buy-back and contracted manufacture arrangements
- Duration of the agreement
- Relationship between the licensor and the licensee (is the latter a wholly owned subsidiary, an affiliate, a joint venture partner or an entirely unrelated third party?)
- Exclusive or non-exclusive character of the rights granted and grants, such as sub-licensing rights
- Risk (or, from the licensee's standpoint, the value) attached to the disclosure of secret or specialized know-how by the licensor
- Potential profit margin on the licensed product or operation
- Degree to which the licensee organization depends on the supply of sub-assemblies, components, catalysts and so on from the licensor
- Capital investment required on the part of the licensee
- Engineering and technical assistance required to launch the licensed operation and the continuing service obligations of the licensor
- Reciprocal licence rights (grant-backs) and non-monetary benefits granted or anticipated under the contract, which are an important consideration today in licensing technology to newly industrializing countries
- Size of the initial lump sum payment and other forms of remuneration provided for in the contract
- Conventional royalty rates for a particular product or industry
- Competitive offers from rival licensors of alternative products or processes

- Attitude of the host country government with respect to acceptable rates and forms of remuneration
- Relative bargaining positions of the contracting parties

(g) *Forms of expressing royalty*

In a licensing agreement, pricing technology is likely to include any or all of the following types of remuneration:

- Running royalties
- Lump sum payments
- A combination of down payment and running royalties
- Lump sum or periodic fees for technical services
- Equity interest in a joint venture
- Reciprocal licence rights and other intangible benefits (e.g. cross licensing)

No matter how royalty is expressed in an agreement, it is always possible to obtain its capitalized value. Thus, the manner of expression has implications beyond the cost of the technology to the licensee or the price obtainable by the licensor.

(h) *Running royalties*

The basic, most prevalent types of remuneration are unit sales and unit production royalties. These are royalty rates based on sales value or per unit royalty fees based on the actual volume or value of products manufactured, processed or sold with the help of the licensed rights or know-how. Both are recurring payments arrived at by applying a specified royalty rate to some agreed-on measure of use or benefits derived from licensed rights. The remuneration corresponding to unit sales (for example, 5 per cent of net selling price) or unit production royalties (for example, per kilogram of product produced) are payable at fixed predetermined intervals.

Royalty arrangements always require a licensee to maintain records of sales and production for inspection by a licensor or an independently selected auditor.

(i) *Lump sum payments*

There are several types of lump sum payment, the most frequent being an initial lump sum payment; a down payment; and a convertible lump sum option, which leads to a paid-up licence.

An initial lump sum payment is usually a non-creditable, non-returnable payment. It must be made upon execution of a contract or before know-how is disclosed. It is a separate and supplementary form of income to the licensor. It also demonstrates the licensee's good faith.

A down payment can be of two kinds: a first instalment payment of a lump sum technology fee, payable in instalments, generally over a short interval; or a non-returnable, creditable fee. The second form is associated with running royalties. The down payment represents an advance payment of the royalties due. Royalties due to the licensor for which credit has been exhausted are then paid as cash royalties.

Licensors sometimes provide the option for a lump sum paid-up fee, which can have advantages for both a licensor and a licensee. The paid-up fee is a pre-stated, contracted, lump sum amount. It relieves the licensee of liability for further cash royalties.

Sometimes the lump sum royalty payment is introduced because of the host country government's policies on limits placed on running royalties, taxation of running royalties and fluctuating exchange rates for the host country's currency.

(j) *Down payment and running royalties*

A down payment and running royalty schedule combines the above two types of payment. Such a format allows a licensor to recover the sometimes considerable costs of transferring technical and engineering know-how and pre-contract expenses. It helps establish a licensee's active interest in exploit-

ing licensed rights. It also insures a licensor against default and the loss of valuable know-how, and ensures a minimum income. The combination of down payment and running royalties is often a stand-in for prepaid minimum royalties. It is possible to negotiate a deferment for running royalties due under an agreement in lieu of the initial lump sum payment or down payment provision.

(k) *Comparison and contrast*

In licensing intellectual property rights, a lump sum royalty is a payment made in lieu of running royalties. It is not a fee for professional services. Thus, a licensor receiving lump sum royalties should have the same obligations as one receiving running royalties, a condition that should be stated in the licensing agreement.

While lump sum and running royalties are conceptually the same, and arithmetically equivalent, there are reasons for choosing one form of payment over the other.

The advantages of lump sum royalties are as follows:

- For the licensee, the cost (or foreign exchange burden) of a technology is known in advance and the licensor is compensated for the risk that a licensee will fail to exploit available business opportunities as well as for the vagaries of a remote relationship.

- The licensee does not suffer the intrusiveness of a licensor examining the licensee's accounts or having them audited; lump sums also relieve a licensor of having to examine a licensee's accounts and understanding the accounting methodologies, which are often statutorily mandated.

- For the licensee, an upward movement of selling prices owing to local factors does not increase the licensor's income at stable exchange rates; for the licensor, currency fluctuations will not have an impact on income.

- For the licensor, the lump sum royalty is attractive when there is a sale or assignment of intellectual property rights, or when the element of technology transfer is a simple one.

- It may also be attractive if the host country tax laws exempt from taxation those lump sum payments made outside the host country for the transfer of rights or disclosure of technical data and know-how.

- For the licensee, the lump sum payment may be of interest if the grants apply to obtaining rights in a patented product, or to a patented process or to sets of drawings, specifications or other technical information that are sufficient to enable the licensee or technology recipient to manufacture and sell products.

On the other hand, certain disadvantages attend lump sum payments:

- In a lump sum agreement, the licensor does not risk income, a major consideration in licensing; correspondingly, incomes do not increase if host country opportunities develop rapidly.

- The licensor's interest in a licensee's enterprise is difficult to maintain over the period of the agreement because remuneration has been obtained in advance.

- Since expansion of the licensee's market would bring in no additional income, the licensor has no incentive to participate in advances such as process improvements.

- In a non-exclusive licence without a most favoured licensee clause, a licensor can license a competing firm within the licensee's country if market opportunities expand, which might jeopardize the advantages of the first licensee.

(l) *Advantages of running royalties*

The advantages are the following:

- The licensor shares the licensee's risk and, where royalty incomes are likely to deteriorate, a licen-

sor can be expected to provide risk-minimizing strategies, for example, changes in manufacturing processes, product design and product/market mix.

- By agreeing at some later time to reduce royalty rates, a licensor can induce growth in the licensee's market if the licensee's output falls behind market growth.

- If the licensor defaults in carrying out the provisions of an agreement, royalty payments can be stopped. On the other hand, if the licensee defaults or goes into liquidation, the licensor's royalty incomes are threatened.

- Royalties ease the cash flow situation of the licensee (or foreign exchange outflow rate).

- Where a most favoured licensee provision has been negotiated, a reduction in royalties rendered to another licensee can be immediately passed on to the licensee.

- Royalty rates can be differentiated with respect to import and export markets, or other matters, and can be contracted to change over time.

- Adjusted royalty rates are possible, for example, the cost of components imported from the licensor or sales of products made to the licensor can be deducted from the product sales value in calculating the royalty base.

- Royalty rates can be readjusted if the know-how fails to perform or if co-granted patents are invalidated, and so forth.

The disadvantages of running royalties are:

- An increase in the price of products owing to local inflation or the taxation of inputs can enhance the licensor's income without the latter making any contribution to the enterprise.

- Neither the licensor's income nor the licensee's payments liability over the contract period can be estimated with any certainty.

- For the licensor, there is no assurance that anticipated incomes from transfer of IP rights will indeed be realized.

(m) *Royalty bases*

Typically, royalty clauses in technology agreements utilize one of two bases: *(a)* product sales price or sales value; or *(b)* unit production. There is, however, a wide variety of techniques for expressing royalties. The type of royalty rate and base selected must be suited to the products and industry operations covered by a particular licensing arrangement.

Sales-based computing

The sales-based computing base is the most widely used in licensing agreements; it is the most easily communicated and can be readily monitored.

The sales-based royalty directly links the income of a licensor to the amount of product actually sold, not product in inventory or goods returned. It is useful for a licensee, because a poor-quality product fetches lower prices. It makes the licensor accountable for the quality of the product. It is used most appropriately where there is a wide mix of products, each of which carries a different price tag.

Sales-based computing is disadvantageous when exchange rates fluctuate, because sales value is computed in local currency. It is also an inappropriate base when products are manufactured with licensed technology but sold indirectly, through parties who have a special relationship to the licensee, nor is it suitable when the product is converted to another product for sale. A plastic resin, for example, may be the end product of the licensed technology, but it may be converted to a film in a secondary operation that is not part of the licensed technology. It is possible to solve such a problem by developing a fair market price for the resin using competitive prices (national or international) or by creating an ad valorem royalty, which is a percentage of the price at which a value-added product (in that case, film) is marketed.

Unit-product computing

Royalties may be linked to the unit or volume of production and calculated as a fixed monetary amount per unit of product produced.

Unit-computed royalties overcome some of the problems encountered with sales-based royalties. The licensor is not concerned with the disposal of a product (such as its conversion into another product) or with marketing through an organization having a special relationship to the licensed enterprise. It is easier to monitor or to assess records, and it is possible to do so by knowing the machine capacity and so on. Importantly, adverse exchange fluctuations do not affect the income to the licensor or the expenditure of the licensee. Unit computing is also a useful device when there are several technologies at work in an enterprise.

Unit-based royalties may be particularly appropriate to the licensee when the domestic sales price of a product is expected to be higher than the international price owing to inflationary pressures in the economy.

On the downside, if the units incorporate any components purchased from the licensor, unit-based royalties are not feasible. Calculating the net value-added on which royalties should be computed becomes too difficult to manage; in such cases, some other computing base needs to be employed.

(n) *Types of rates*

Variable, graduated and cumulative rates

In most contracts, although different groups of products may be licensed, the royalty rate remains the same for the duration of the contract, irrespective of the volume of products produced or sold.

However, some licensing agreements provide for variable, graduated or cumulative royalties. In the variable rate contract a lower starting rate may apply, followed in subsequent years by a higher rate so as not to burden a licensee when a market for the licensed product is being established. Some contracts, on the other hand, provide for higher royalty rates initially, when sales are lower, to give the licensor a reasonable compensation, and lower rates afterwards, when sales are higher and the licensor can afford such a concession.

Cumulative royalties

Cumulative royalties can also be negotiated in agreements. In such a case, a royalty is payable on the volume of the product and is unrelated to time. Thus, the royalty rate may be 5 per cent for the first 10,000 units produced; 4 per cent for the next 10,000 and so on. However, minimum royalties may apply in such cases.

Differential royalties

Differential royalties, that is, different rates of royalty, may be incorporated into agreements for products made under licence when some will be marketed under the licensor's trademark and others will be marketed on a private label basis without a trademark.

3. Minimum royalties

The licensor sets a minimum annual royalty requirement that must be met regardless of a licensee's output, sales or use of the licensed rights. It indirectly establishes a licensee's minimum operational goals. It is most common when a licence has been granted on an exclusive basis or when there is a sub-licensing grant. Minimum royalty provisions should be accepted on the basis of reasonable market forecasts.

4. Price basis

Royalties can be calculated on three prices: gross selling price, net selling price and fair market price.

(a) *Gross selling price*

Royalties based on the gross selling price are convenient since the requisite information is commonly presented in company balance sheets or can be obtained from sales invoices. A licensor commonly prefers such an arrangement, even if it is to be offset by some reduction in royalty rates. For a licensee, a disadvantage is that the profits made by the licensor on components purchased from a licensor are not deducted.

(b) *Net selling price*

The net selling price is useful for calculating royalties to eliminate a licensee's disadvantages when the sales price contains items unrelated to the technology or when related items, for which a profit has already been gained, are supplied by a licensor or others. The net selling price, therefore, consists of the sales price less certain cost elements.

Among the specific items whose subtraction from the selling price the parties may have to negotiate are the following:

- Packing expenses
- Insurance premiums
- Transport expenses
- Export and import duties, customs tariffs
- Turnover or sales taxes
- Ordinary commercial discounts
- Returned merchandise
- Installation expenses at the place where the product is used
- The portion of the price of the product that reflects the royalties

5. Fair market price

When a licensee sells a licensed product to a third person in a special relationship, the calculating base has to be artificially created. The fair market price is defined in terms of one or more of the following methods:

- The uncontrolled price method, that is, the price offered to, or bid by, a purchaser of the product who is not in a special relationship with the licensee, or licensor
- The resale price method, that is, the price obtained on resale of a product by a licensee's customer, less resale mark-up
- The cost mark-up method, that is, the cost of producing the licensee's product with a specified percentage of that cost or a fixed sum added as the profit on that sale

6. Legal-administrative provision

In addition to establishing the types and levels of remuneration to be paid by the licensee, the royalty provisions of a contract should settle:

- The frequency, time, method and place of payment
- The currency in which payment is to be made
- The exchange rate to be used
- Whether or not the payments are to be free or net of local taxes and fees
- The procedure to be followed and the options available to a licensor in the event payments are blocked or cannot be transferred in the manner of form stipulated
- The methods of calculating, reporting, and verifying royalties and other fees due under the terms of the contract

7. Evaluation and valuation

When looking at a technology portfolio, it is important to make a distinction between evaluating it and giving it a value, whether on the receiving or on the giving end.

Evaluation and valuation

- Challenges
- Portfolio evaluation steps
- Reasons for valuation
- Valuation techniques
- Comparison of valuation techniques

Evaluation will give qualitative information about which patents and technologies have a higher probability of being important. It typically will assign a range or a qualifier (high, medium, low). This technique will allow unimportant or trivial assets to be eliminated and to concentrate quickly on the ones most likely to yield results or generate value. Secondly, it will allow licensing candidates to be assigned priority for best results. It is relatively fast and inexpensive.

In contrast, valuation is much more time consuming. It focuses on specific outcomes or business in order to assign a "value" to the technology based on the given assumptions.

Evaluation, like valuation, needs multifunctional involvement. It is also context dependent but to a lesser degree than valuation. The computer tools described under "Technology sourcing" are widely used in the process. It is used in industry to effectively manage an intellectual property (IP) portfolio and to make strategic decisions.

Evaluation is a multi-step process. It starts with assembling the portfolio, which needs to be carefully done to make sure all IP needed is included and nothing more. This has become particularly difficult with the numerous mergers, divestitures and ventures, as well as business swapping. It is important to include an inventory of all encumbrances assigned to the portfolio, such as third-party rights, field restrictions and confidentiality agreements.

The next step in the process is an initial evaluation of the technical and IP relevance, using tools such as the citation indexes described earlier and the science index (an index reflecting the relative age of all scientific references to the technology).

Such an evaluation is combined with an assessment of the technology profile. It is common, whenever possible, to include some key inventors (from the portfolio or from a competing portfolio) in the technical relevance analysis.

Following the citation and inventors analysis, patent trees or patent maps are generated to define the competitive environment of the technology.

Finally, individual claims and patent construction of the most relevant patents are studied to verify the breadth of protection or lack of it.

Such a multi-step evaluation will yield a portfolio profile, including potential market opportunities and threats that will be reviewed by multifunctional teams. Members of the teams will be research and development, IP and business people, at the minimum.

If needed, a formal valuation will be made of the most relevant patents in the portfolio to complete the analysis. There are a number of reasons for valuing an IP portfolio. As described earlier, it is important to manage an IP portfolio and focus on a particularly important part of it. Licensing in and out, selling or acquiring and alliances will also demand a good assessment of the value of a technology.

Litigation, mergers, acquisitions and divestitures also require a value to be assigned to an IP portfolio. Finally, the tax authorities require an "arm's-length" determination of the value of technology used by subsidiaries.

8. Pricing methods

There are four major pricing methods, with a number of variations: cost, market value, the 25 per cent rule and net present value. Most other methods can be traced back to one of the above four.

(a) *Cost methods*

The cost method determines either the cost incurred to develop the technology or the cost to avoid the technology, while the cost avoiding method usually sets the highest limit of value. It relates to all costs incurred by a third party to legally circumvent the technology being transferred.

Very seldom do inventions come from a flash of genius. They are more likely to be the result of significant research and development efforts. In most cases, systematic work is needed, which takes time and money. This also holds true for both trademarks and technical inventions. Taking this into consideration, it is usually possible to determine the cost to develop the invention or at least the cost of developing a similar invention for a third party. The inventor should assume that the licence fees should at least cover the development costs and possibly an estimated profit. The length of time the invention will be commercialized must then be determined, and a possible royalty rate calculated.

Cost approach

Principle:

- Based on the principle of substitution
- Relevant costs and opportunity costs are considered
- Circumvent competition
- Avoid development costs

Disadvantages:

- No immediate earnings
- Based on research and development costs
- Embryonic

A number of licensors or licensees also look at what have been the costs incurred by the developer of the technology and try to use that as a benchmark. The latter method has little bearing on value because it does not take into account the efficiency, or lack of it, of the licensor or its potential uses.

Both methods are used mostly for early stage technologies.

(b) *Market value*

The market value method is a preferred method as it refers to the main reference of the economy, the market. One variant consists of negotiating simultaneously several licences for the same technology and letting competition decide how to determine the final value.

Market approach

Principle:

- Compares similar technologies
- Check if comparables are acceptable
- Establish ballpark values

Risk:

- Comparables are subjective

The market value method is to examine the rates (prices) that have been paid for similar transactions and similar technologies. The difficulty is to get access to actual data. A number of publications, such as *Les Nouvelles* (the official journal of the Licensing Executives Society International), periodically have surveys and articles on royalty ranges used by different industries.

What is frequently noticed is that certain industries or technology sectors quote "average rates". Reference to them is made in negotiations. Mature technologies in slow-moving industries or with large volumes can have rates of 1 per cent or below, while industries with high-value-added components might command rates up to 20 per cent. Most rates vary between 3 and 8 per cent.

(c) *Return method (net present value method)*

For a project that can be defined, it is usually possible to get an approximate idea of the net profits that could potentially be generated by the technology. It is legitimate to share such potential profits between licensor and licensee. The distribution ratio of the profits between licensor and licensee is variable and will depend on the specific context of the transaction. Some of the elements to consider include:

Income approach

Future income: amount—time—risk

Amount:
- Excess income
- Lost income
- Residual income
- Relief from royalties

Time:
- Statutory or legal
- Functional or technical
- Economic

Risk:
- Prevailing rates
- Liquidity factor
- Business risk premium

- Would the licensee have had the possibility to be in such a business without the help of the licensor?
- Would the licensee have had a competing business in the absence of a licence?
- How critical is the licensed technology to the profitability of the business?
- Does significant know-how complement patent rights (e.g. technology, suppliers or potential customers networks, marketing skills)?
- What is the ratio of risks to be taken by licensee and licensor?

The present value method brings back the value of the royalty payments to a specified time by discounting future payments by a factor related to the risk-adjusted rate of return of capital.

The concept of "present value" is routinely applied in the financial analysis of industrial projects to select among alternative financing modalities. The approach can be readily, and equitably, applied for comparing different forms of royalty remuneration. The objective in present value assessment is to capitalize periodic and variously distributed technology-related expenditure by discounting future receipts in terms of the present value of money.

The arithmetic is quite simple. Although remuneration is expressed in different forms (lump sum, flat fees, running royalties, etc.) and involves different flows of money over time, a finite number can be generated to represent remuneration for the technology in an unbiased manner that allows it to be used as a negotiation tool.

It is important to recognize that all such calculations require a licensor to share with a licensee information about the costs of raw materials, utilities, fixed costs and so on, so the licensee can make the projections. Such general information should be readily available, in particular under conditions of confidentiality. If the licensor does not share such information, the licensee will have to establish its own estimates.

(d) *Profit sharing 25 per cent rule*

Studies by the United States Government covering a wide range of industries and sectors within particular industries, generally of the commodity types, have indicated that, in practice, the share of the licensor averaged around 25 per cent of the profits generated by the technology. The 25 per cent factor would mean royalty rates in the range of 3 to 7 per cent for consumer products.

The fair share of the licensor must take into account the point on the technology life cycle curve at which a technology is being licensed.

25 per cent rule

Principle:
- 25 per cent of earnings generated by technology

Disadvantages:
- Empirical
- No theoretical base
- Does not introduce development

Test:
- Close to reality
- Ballpark

Beyond a certain point, which is determined qualitatively, the technology would have passed its peak and overall profits would be declining. It would no longer have the characteristics of valuable competitive technology and should be contracted out as technical services. Obviously, such technology cannot command a premium and profit-sharing should remain below 25 per cent.

It is obvious that with technologies well into the ascending phase, income-sharing would tilt heavily in favour of the technology innovator and the heuristic "25 per cent factor" would not apply. Quite often, a technology is licensed in at that point for the purpose of improving it or applying it in another context.

In practice, a composite of all the above methods is used. The best practice is to analyse every single project in detail before deciding which method*(s)* are applicable. This will satisfy both parties and ensure the best commercial exploitation of the technology and of the invention. The quality of the competitive advantage given by the IP is the determining factor.

Besides the determination of the royalty rates, it is essential to determine, without ambiguity, the basis for the payments and to select one that is easy to determine and is already measured or recorded by the licensee. This will greatly facilitate management of the project and eventual later audits.

TECHNOLOGY TRANSFER OPERATIONS
NEGOTIATIONS

- Principle of negotiation
- Negotiation teams
- Negotiation strategies
- Intercultural negotiations
- Valuation methods

(Negotiation exercise)

TECHNOLOGY TRANSFER OPERATIONS
NEGOTIATIONS

Negotiations

You don't get what you deserve: you get what you negotiate

Planning and organizing negotiations

- Create an effective negotiating team
- Roles of the team leader and the members
- Lawyer as negotiator
- Evaluate the proposal—analyse the separate issues
- Develop objectives and priorities
- Prepare a conducive environment
- Recognize cultural/language differences

TECHNOLOGY TRANSFER OPERATIONS
NEGOTIATIONS

Planning

- Objectives
- Alternatives
- Teams

Negotiation teams

- Composition
- Team members
- Roles and responsibilities

Negotiating tactics

- First call
- Meetings
- Personnel
- Relationships

TECHNOLOGY TRANSFER OPERATIONS
NEGOTIATIONS

Negotiation basics

- Focus on the problem
- Focus on interests
- Develop multiple options

Negotiating tactics

- First call
- Meetings
- Personnel
- Relationships

Negotiation organization

- Length of meetings
- Frequency of meetings
- Duration of the negotiation process
- Informal meetings

TECHNOLOGY TRANSFER OPERATIONS
NEGOTIATIONS

Composition of negotiation teams

- Preparation team
- Core negotiation team
- Support team for negotiations
- Implementation team

Team members

- Functional and negotiating role
- Discipline
- Leadership

Negotiation team roles

- Leader
- Secretary
- Observer
- Chief negotiator
- Support

TECHNOLOGY TRANSFER OPERATIONS
NEGOTIATIONS

Team preparation

- Role playing
- Familiarity with the issues
- Tactical issues
- Operational items

Negotiation time frames

- Iterative process
- Longer than planned
- Use time-outs and silences

Negotiating styles

- Know the people
- Strategy and tactics
- Transactions versus relationships
- Win-win = good relationships

TECHNOLOGY TRANSFER OPERATIONS
NEGOTIATIONS

Considerations

- Business
- Financial
- Trade offs

Deal memo

- Licence terms
- Sub-licence
- Field restrictions
- Reserved rights
- Payments

TECHNOLOGY TRANSFER OPERATIONS
NEGOTIATIONS

Deal memo

- Diligence terms
- Confidentiality
- Warranty
- Indemnification
- Improvements

Closing the deal

- Review terms
- Communication
- Focus and plan
- Reporting/record-keeping

TECHNOLOGY TRANSFER OPERATIONS
NEGOTIATIONS

Positive negotiation outcome

- Everyone wins
- Beginning a relationship
- Sign agreement

Negative negotiation outcome

- Timing delays
- Team changes
- A new potential partner appears
- Internal strategic changes occur
- A partner walks away

TECHNOLOGY TRANSFER OPERATIONS
NEGOTIATIONS

The technology transfer relationship

- Structure of the relationship
- Legitimate interests of the parties
- Win-win approach
- Proposal-making
- Contract sets down what is negotiated

Negotiating techniques

- Structure the negotiations
- Defer difficult issues
- Take up general positions before specific
- Use committees and support groups
- Keep score of concessions: the two-way street argument
- For difficult issues, "peel the onion"

TECHNOLOGY TRANSFER OPERATIONS
NEGOTIATIONS

Negotiating tactics

- Create "good guy", "bad guy"
- Divide and rule!
- "Trial balloon", "straw man", "what ifs"
- Threatening a walkout, ultimatums
- Beware of "standard terms", "standard contract", "government rules"
- Set the precedent

TECHNOLOGY TRANSFER OPERATIONS
NEGOTIATIONS

Intercultural negotiations

- Nationality
- Culture
- Race and gender
- Language
- Corporate culture

TECHNOLOGY TRANSFER OPERATIONS
NEGOTIATIONS

General issues

- Preparation
- Cultural and historical awareness
- Value of time
- Hierarchy
- Taboos

Interpreter

- Own or hired
- Role and responsibilities
- Take small bites
- Beware of "secret knowledge"
- Replay

TECHNOLOGY TRANSFER OPERATIONS
NEGOTIATIONS

Summary

- Creative problem resolution
- Do your homework
- Be fair

TECHNOLOGY TRANSFER OPERATIONS
NEGOTIATIONS

Valuation

- Payment for what?
- Quality of technology acquired
- Remuneration versus profitability
- Royalties as a profit-sharing device
- Assessing remuneration
- Payment modes and alternatives
- Determination of value

TECHNOLOGY TRANSFER OPERATIONS
NEGOTIATIONS

Payment and the quality of technology

- Acquisition to be gainful to acquirer over its time span
- Issues of competitiveness, utility, efficiency, protection, support and content
- Attributes must converge to profitability or to savings
- Value of industrial property rights versus services

TECHNOLOGY TRANSFER OPERATIONS
NEGOTIATIONS

The price of technology

- Origins of the term "royalty"
- The technology life cycle curve
- When technology enters the market, demand and supply generally determine prices

TECHNOLOGY TRANSFER OPERATIONS
NEGOTIATIONS

Technology phases

UNIDO Manual on Technology Transfer Negotiation, p. 254

TECHNOLOGY TRANSFER OPERATIONS
NEGOTIATIONS

Technical fees

- Fees are related to the quality of the efforts to be made: skill level x time factor of effort
- International rates prevail for different qualities of service
- Issues of "one time" and long-term services

Assessing royalties

Two important principles:

1. All royalty payments represent a sharing of the licensee's profit between the licensee enterprise and the licensor on relative risk
2. All forms of payment can be reduced to a single equivalent payment for comparison and computation

TECHNOLOGY TRANSFER OPERATIONS
NEGOTIATIONS

Royalties and the technology life cycle I

- Ascendant phase:
  - Highly profitable technologies
  - High risks (from competitive developments)
  - Reasonably high-cost technology
  - Short duration of the high profitability period
- Mature phase:
  - Low risk in large markets
  - High-cost, low-risk technology
  - "Commodity product"-like returns
  - Fairly long duration of the profitability level

TECHNOLOGY TRANSFER OPERATIONS
NEGOTIATIONS

Royalties and the technology life cycle II

- Decline phase:
  - Riskier than in the mature phase
  - Low-cost technology
  - Low returns
  - Decline period variable
- "Technique phase" of the technology life cycle
  - Down-scalable technology, easy absorption
  - Low risk, low returns
  - Technology cost = skill costs

TECHNOLOGY TRANSFER OPERATIONS
NEGOTIATIONS

Payments for technical services

Payments are made for:

- Information content, data and "show-how"
- Transfer of technical and commercial skills
- Training and "holding hand" assurances

Cost of technical services determined by:

- Overheads for gathering information, formatting and transmittal
- Kinds of skill
- Duration of assistance
- Opportunity costs

TECHNOLOGY TRANSFER OPERATIONS
NEGOTIATIONS

Technology payment forms

Forms of royalty expression

- Lump sum royalties
- Running royalties
- Combination

Computing base:

- Sales value (variations: gross and net prices)
- Unit production

Cumulative and graduated royalty schedules

TECHNOLOGY TRANSFER OPERATIONS
NEGOTIATIONS

Evaluation and valuation

- Challenges
- Portfolio evaluation steps
- Reasons for valuation
- Valuation techniques
- Comparison of valuation techniques

TECHNOLOGY TRANSFER OPERATIONS
NEGOTIATIONS

Challenges in licensing business

Selecting the right area of portfolio for review

- Finding patents with licensing value efficiently
- Prioritizing licensing candidates for best results

Portfolio evaluation in industry

- Multiple steps
- Need multiple functional input
- Use of computer tools
- Evaluation versus valuation
- Management tool
- Context dependent

TECHNOLOGY TRANSFER OPERATIONS
NEGOTIATIONS

Evaluation

- Assemble a portfolio
- Technical and intellectual property relevance
  - Citation (eliminate self-citation)
  - Science index
- Profile of key inventors
- Patent trees
- Groupings
- Individual patent and claim construction
- Reality check

TECHNOLOGY TRANSFER OPERATIONS
NEGOTIATIONS

Patent portfolio evaluation

Number of patents	1 500	400	90	25
Task	Portfolio organization	Statistical analysis	Patent claims	Individual analysis (valuation)

TECHNOLOGY TRANSFER OPERATIONS
NEGOTIATIONS

Reasons for valuation of the intellectual property

- Manage the intellectual property portfolio
- Licence of technology
  - Determine fair payments and royalties
  - Identify risk factors
  - Audit assessments
- Sell, acquire or donate intellectual property
- Mergers, acquisitions and divestitures
- Equity participation
- Finance
- Inter-company transfers
- Establish an intellectual property holding company
- Litigation and disputes

TECHNOLOGY TRANSFER OPERATIONS
NEGOTIATIONS

Valuation—licensing context

Four major systems with variations:

- Cost
- Market
- The 25 per cent rule
- Net present value

TECHNOLOGY TRANSFER OPERATIONS
NEGOTIATIONS

Cost approach

Principle:

- Based on the principle of substitution
- Relevant costs and opportunity costs are considered
- Circumvent competition
- Avoid development costs

Disadvantages:

- No immediate earnings
- Based on research and development costs
- Embryonic

TECHNOLOGY TRANSFER OPERATIONS
NEGOTIATIONS

Market approach

Principle:

- Compares similar technologies
- Check if comparables are acceptable
- Establish ballpark values

Risk:

- Comparables are subjective

TECHNOLOGY TRANSFER OPERATIONS
NEGOTIATIONS

25 per cent rule

Principle:

- 25 per cent of earnings generated by technology

Disadvantages:

- Empirical
- No theoretical base
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Test:

- Close to reality
- Ballpark

TECHNOLOGY TRANSFER OPERATIONS
NEGOTIATIONS

Income approach

Future income: amount—time—risk

Amount:

- Excess income
- Lost income
- Residual income
- Relief from royalties

Time:

- Statutory or legal
- Functional or technical
- Economic

Risk:

- Prevailing rates
- Liquidity factor
- Business risk premium

TECHNOLOGY TRANSFER OPERATIONS
NEGOTIATIONS

Valuation by technology

Objectives	*Market*	*Cost*	*25 per cent rule*	*Net present value*
Early stage	X	X		
Process	X		X	X
Product	X		X	X
Cost savings		X		X

TECHNOLOGY TRANSFER OPERATIONS
NEGOTIATIONS

Valuation of intellectual property

Objectives	*Market*	*Cost*	*25 per cent rule*	*Net present value*
Internal valuation	X	X		X
Licensing (voluntary)	X		X	X
Licensing (coercive)	X			
Alliances	X	X		X
Cost savings	X	X	X	X

TECHNOLOGY TRANSFER OPERATIONS
NEGOTIATIONS

Comparison of valuation methods

Cost

- Easy to determine
- Irrelevant in most cases
- Maximum-minimum

Market

- Need for comparables
- Extrapolation
- No consideration of relative risks
- Preferred by legal entities

25 per cent rule

- Simple
- Inaccurate
- Quick

Net present value

- Time-consuming
- Complicated
- Most accurate

TECHNOLOGY TRANSFER OPERATIONS
NEGOTIATIONS

Valuation

- No method is optimum
- Use at least two methods
- Do a reality check
- Only a tool

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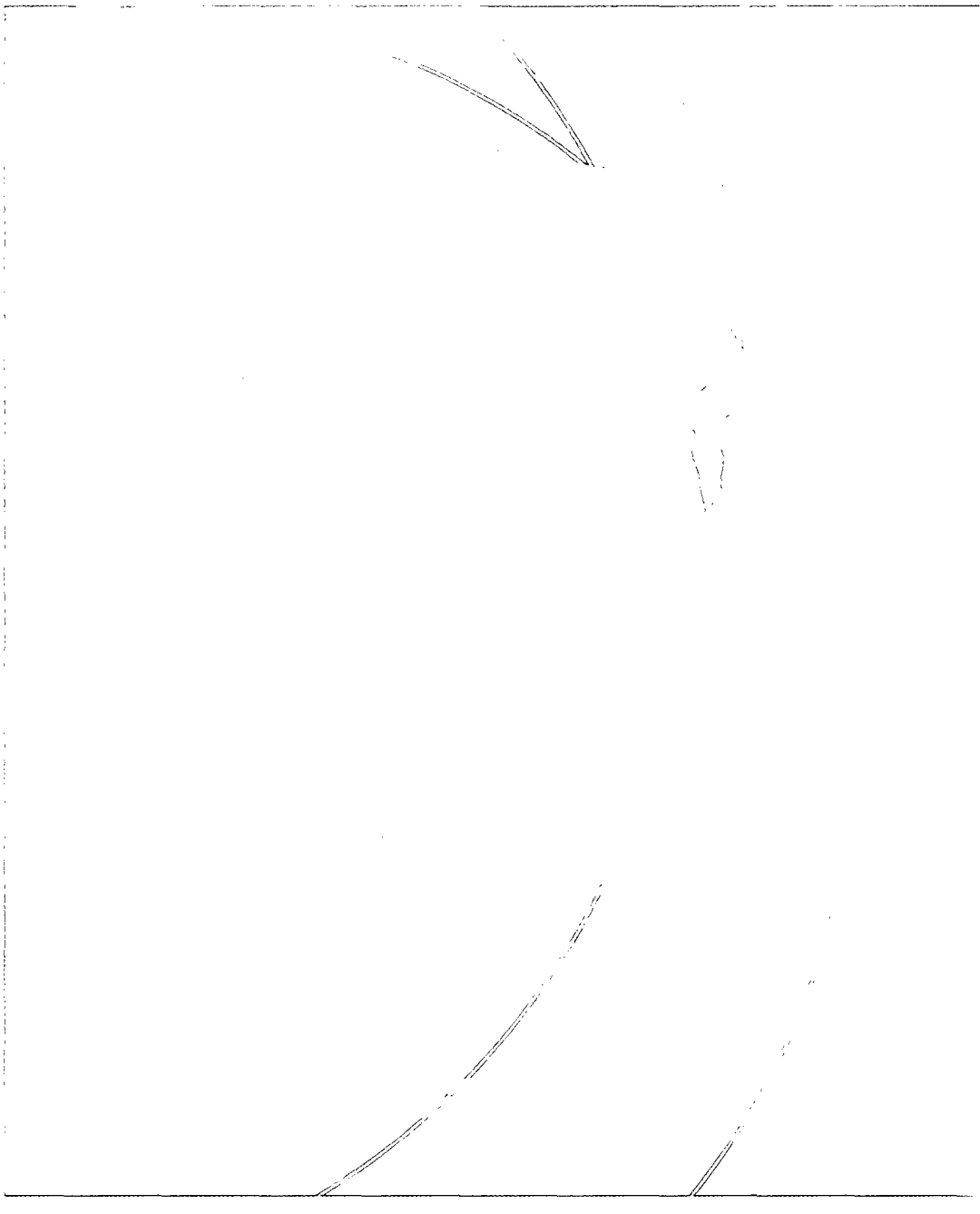
V. AGREEMENTS



V. AGREEMENTS

A. General principles

General principles of contract drafting

- Why an agreement?
- What type of agreement?
- What are the issues?
- Take the business approach
- Negotiate before you draft
- Use a mirror
- Big issues first
- Make use of the appropriate resources
- Be flexible
- Take your time

Once an agreement has been reached, it is time to draft a formal document. A well established process is needed to avoid unintended consequences for the corporation, to make sure that the intent of all stakeholders has been taken care of and to ensure management buy-in.

It is necessary firstly to establish the kind of agreement needed (e.g. licence, joint venture or development) and to frame the important issues. Even though an agreement is a legal document, a business approach is recommended.

Drafting an agreement "just in case" at the beginning of the negotiations is counterproductive. If the other party accepts to examine it, negotiations will immediately be drawn into minutiae, forgetting the major issues and the reasons for the business transaction.

Any agreement needs to be looked at from both angles. If certain clauses imposed on the other party do not seem fair or acceptable, the other side will most likely reject them.

Unless they are contentious, it is advisable to start with the main issues and to be flexible.

Drafting a good agreement takes time, so it is important to be patient. A well established process is needed to make sure no terms that would be detrimental to other parts of the corporation or that would put unintended restriction on their activities (contamination) are introduced. A good process will also make sure management is kept up to date and buys into the agreement at each step. The process will serve as a communication tool with the other interested parties and minimize use of resources.

1. Timing

Agreement timing

- Prepare before you negotiate
- Negotiate before you draft
- Plan before you sign
- Maintain contact after you sign

Four key principles will optimize efficiency and will lead to a better outcome:

- Prepare before negotiating
- Negotiate before drafting
- Plan implementation before signing
- Maintain contacts after signing

2. Rationale

When entering into an agreement, it is important to know what the major reason is to do so, for example:

- Optimize technology return. In such a case, financial returns—long or short term—will play a primary role.

- Strategic decision. It may be to set up de facto standards for certain technologies worldwide, or in order to create long term partnerships.

Reasons for licensing

- Optimize technology return: licensing as a business
- Strategic decision
- Entering or exiting a business
- Freedom of action
- Forced to license
  - Protect sales or raw material position
  - Law

- Entering or exiting a business. Financial (exiting) or technology impact will be the controlling factors.

- Freedom of action. The most important consideration will be the intellectual property (IP) rights. Associated know-how will be secondary.

- Forced to license. This may be because important customers require a second source of supply or compulsory licensing through legislation, court decisions or litigation.

3. Process steps

At different stages of the licensing process, different types of agreement will be needed. It is essential to match the inputs from the licensing process to the output and keep in mind the overall reason why such agreements are entered into.

Licensing process steps

Input	Output
• Need identification	• Invention
• Sourcing	• Secrecy agreement
• Assessment	• Option agreement
• Negotiation	• Agreement
• Financing	• Management approval
• Transfer of technology	• Review of documents, intellectual property
• Implementation	• Amendment—royalty reports
• Termination	• Amendment

Seven major steps can be identified in the licensing process:

- Identify the technology. The corporation or State defines what is needed and why.

- Evaluation of potential. What the particular technology or technology type would bring in terms of additional assets and capability; how it would fit with the local environment (technical, financial, economic, human).

- Identify the targets. Once the technology has been identified and its impact assessed, who the potential companies are that would either be interested (out-licensing) or could provide access (in-licensing).

- Negotiate the agreement. Come to defined business terms with the identified target(s). The output is a satisfying negotiated agreement.

- Transfer the technology. Planning of the transfer should take place during the negotiation process. How, by whom and when should be included into the main agreement or an ancillary one.

- Monitor the licence. One of the most frequent mistakes made by licensees and licensors is not to continuously monitor the health of the relationship in order to avoid or to minimize potential future problems.

- Terminate the deal. Each licence has an end point. It is important to define clearly what it is and what the consequences are for both parties.

The role of a contract is twofold; it records the transaction undertaken by the parties and guides its implementation.

When a transaction becomes subject to litigation, the first thing considered is the contract text. It represents the intent or will of the parties. It is vitally important that a contract spell out as clearly and precisely as possible the identity of the parties and the character or nature of the contract. This includes its subject(s), the grant of rights and their limitations,

the scope and limits of supplies and other obligations, the consequences of possible defects and the termination or expiration of rights and obligations.

Clarity and precision have a further advantage in the case of a long term agreement. The persons dealing with it on both sides may change. A clear, well phrased text will prevent newcomers from interpreting the contract differently from how it was initially intended. Conciseness generally has the same effect.

B. Contract characteristics

1. Correctness, fairness and balance

A contract should correctly present the basic interests and expectations of the parties and exhibit fairness and balance in the rights and obligations asserted. Licensees are most concerned with making it productive and profitable. Licensors are concerned with proper protection of their technology from misuse and with timely realization of payments. Contracts must endeavour to show that there is a balance in such expectations.

2. Homogeneity

A contract is a homogeneous document and not simply a loose collection of clauses. The clauses (and conditions) of the contract should be interrelated and consistent with each other. They form a closed-loop control system, where any action taken to modify one element of the system will also have an effect on other elements.

Contract characteristics

- Correct, fair and balanced
- Homogeneous
- Complete but not nit-picking
- Minimum requirements and conditions
- Anticipates major potential problems
- Unique
- Clear and consistent
- Understandable by a layperson

3. Purpose of a contract

The purpose of a contract is to set out the understanding, arrived at after negotiation, of parties to an undertaking or venture. It also provides for the enforceability of such an understanding in a court of law. A contract usually addresses three main issues: *(a)* the subject matter of the agreement; *(b)* the business interests of the parties; and *(c)* legal administrative provisions that govern undertakings under the contract and its enforceability. A contract is typically a complete and self-contained document, but sometimes it can refer to another agreement.

4. Unity of concept and completeness

In a well thought out contract, there will be an inherent logic of development, a close interrelationship among the various elements and a state of completeness. Thus, the recital clauses give the background for the undertaking, in particular the intentions of the parties. The definition clauses will pay specific attention to the terms of the contract so as to reduce ambiguity. The grants section will state the specific right given by the licensor to the licensee, the obligations of the licensor in connection with that grant and the reciprocal obligations of the licensee.

The clauses need to be complete in themselves and also exhibit a relationship to those clauses with which they are allied or interlocked. A good contract will also be complete in the sense that, should the parties discharge their respective obligations as set forth in the contract, the undertaking to which the contract applies will prove successful and will meet the original expectations of the parties.

5. Establishing minimum requirements and conditions

Once the main objective of the contract is clear and the process of implementation has been considered,

the contract has to clarify the minimum requirements and conditions of the contract. It must set the limits for all essential rights and obligations that must be achieved in order to ensure its success.

6. Anticipating problems

The draft team's mission is to project scenarios, from mere annoyances to worst cases. Try to identify potential problems 5 to 15 years hence and draw up contingency plans for what can go wrong. Answering questions such as the following can develop such contingencies:

- What happens if the market changes?
- What happens if the licensor or licensee find new applications?
- What if the patents are declared (partially) invalid?
- What if competitors come up with a better technology?
- What if the licensor decides to grant the licence to someone else who intends to break into the same market (i.e. a competitor)?
- What if someone infringes the licence rights?
- What if the licensee wishes to get out of the agreement?

The contract should be drafted in language that explicitly covers most adverse turns of events and other possible changes.

7. Originality

Each contract is unique and irreproducible. It should be tailored to fit only the project in question. Checklists, model contracts, model forms, form books and similar agreements should only be used to remind one of items to consider.

8. Time

Drafting contracts is a time-consuming job. Enough time needs to be taken to produce a useful draft. A good contract will always take time to draw up, but it will endure.

9. Clear and consistent language

A contract is a complex business document put into legal or contractual language. The contract should be in everyday language using terminology accepted and understood in the branch of business involved. All aspects and issues must be covered and all implications of the words used must be examined.

The choice of words is very important. The drafter must choose words that are clear, concise and explicit. They should express a notion in as few words as possible. The chosen word or words should have a connotation covering all of the meanings intended but nothing more than intended. The choice of words may be vital when it comes to interpretation.

10. Drafting the contract

Who drafts the agreement—licensor or licensee? There is certainly an advantage for whoever initiates the draft, but such an advantage is smaller than it is portrayed to be. As the contract has to balance the interests of both parties, the drafting party should

Drafting the contract

- Who drafts the agreement, the licensor or the licensee?
- The drafting team—and the main drafter
- Contract sequences in the implementation process
- Drafting checklist
- Role of recital clauses
- Importance of definitions
- Mind the boilerplate clauses

take a reasonable approach. Not doing so risks destroying the trust that should already exist between the parties at that stage and risks the termination of the negotiation, at worst, or lengthy delays, at best.

The receiving party should take care of assessing the fairness of the draft and not hesitate to counter with an opposing draft if the first one was unfair and biased.

Drafting is done by a team and reviewed and approved by the negotiating team. The draft itself should follow the contract and implementation sequences in logical order.

Use of checklists should be restricted to what they are intended for—a reminder of potential issues to address.

There are actually two checklists: one lists the problems to be dealt with in the contract and the second lists the sections and main clauses. The items on the two lists will obviously not be identical. Such checklists should not, however, be incorporated into contract clauses or sections in the final version of the draft. They are meant only to ensure that important matters have not been overlooked.

11. Definitions

Modern drafting practice calls for incorporating a set of definitions appearing as early as possible in the text of a contract. The number of definitions and their nature vary from contract to contract. Definitions explain and limit what is meant by a particular term. The definition given applies only to the contract in question. Separating out the definitions into a set facilitates the understanding of the contract since a focused meaning is given to terms not otherwise set down in legal codes or well known in commercial practice.

The definitions are not a mere glossary of terms in the contract, but are part of it. Besides avoiding defining a term every time it occurs, the definition also helps in official correspondence that will take place after the agreement becomes effective.

12. Recital or whereas clauses

Recital or whereas clauses inform a third party looking into the contract about the intentions or economic aims of the parties, the background or the premises to the agreement and its scope. Such clauses can play a critical role in judging issues that are not addressed in the contract but that come in the picture unexpectedly during implementation. They create no contractual obligation but they state facts in everyday language.

Some important areas covered by the recital clauses are the following:

- Business background
- Desire and willingness of parties to enter into the agreement, what the licensee wishes to obtain and what the licensor is willing to grant
- Expression of mutual interest or "mutual covenant" in the success of the enterprise
- Other statements, such as a statement of the licensor regarding its familiarity with the business and technical environment of the licensee's country (of particular interest to developing countries)
- Statements about the future intentions of the parties

13. Choosing the law

A useful step is to choose the law governing the contract because what such a law says about the subject must be known. Everything that the law says is valid by implication. This means that if the contract does not specify or stipulate a certain obligation, right or consequence, the stipulations of the law concerning such obligations, rights, consequences and so on will be valid.

14. Identifying the parties

The official names and addresses of both parties should be clear and exact. They should be followed literally to the letter.

15. Formulating the aims of the project

The basic questions any contract has to answer are who, what, when, where and for how much?

16. Declaring the subject matter

The next step would be to declare the subject matter of the contract, such as:

- A licence on the patent*(s)*, if any, the know-how, the trademark, the model or the software
- A transfer of the technology in its various forms: written technical documentation with a specified content, consultations, training and assistance in the procurement of equipment
- Supply of equipment and supervision of erection and commissioning
- Other services, such as management

To ensure consistency throughout the contract, it is advisable to describe the above subject matters as to their contents, limits and implications for the other party. Attention should be paid to the list of obligations of both parties, to the checklist of problems to be dealt with and to the process of implementation.

The clause on the licence should be written first. This means, for example, identifying all patents licensed. The contents of the licence and its limitations should be described. The warranty against legal defects and the problem of infringement should also be dealt with.

The licence clause should be followed by the clause on the transfer of technology, for example, material dealing with the technical documentation, engineering, and training and supervision. The clauses should address performance guarantees, that is, how the tests should be performed, conditions for them, how the results should be registered, evaluated and calculated, and what the consequences of such results should be.

The licence clause should be followed by clauses dealing with equipment supplies. Areas covered by such clauses include specifications, delivery times, packaging, markings, transportation, delays, erections, commissioning, testing, quality control, mechanical guarantees and their content.

The clause on financial conditions should contain prices, conditions for payments, documents for payments and financial securities, and insurance should be dealt with. Conditions dealing with coming into force, term, possibilities for termination, rights surviving the term and settling of possible disputes should also be drafted.

Cooperation between the parties after implementation should be clearly detailed, for example, exchange of development results, consultations, joint research and development, rights and obligations originating from such cooperation, their terms, and the expenses involved.

It is suggested that a list of the fundamental terms should first be made and then the terms should be defined. It is advisable to complete the list as drafting proceeds.

17. Checking the draft

Revision is an important part of drafting.

It is important to revise the draft one aspect at a time. In different readings, look for the following things:

- Vagueness or ambiguity of terms or notions
- This process should be repeated until uncertainty has been reduced to the minimum tolerable level and the text is clear, concise and readable
- The sequence of definitions from the standpoint of dependence and of fundamental or less fundamental character
- Consistency of terms

- Service and counter service, mutual obligations
- Chronology of the implementation
- Terms and dates, factuality and consistency
- Repetition of "what could go wrong?"
- The placement of annexes and their content
- The system of references in the text and the structure of the agreement (titles of subdivisions, the logic of divisions and subdivisions, the numbering system, indentations, etc.)
- Important aspects that may have been overlooked

A transfer of technology should be based on truthful, long-term cooperation between the parties and on mutual goodwill, with intent to meet obligations together in order to share the fruits of joint success. Nevertheless, a contract is still required to record the agreement. It will direct the parties as to what should be done if certain events occur and should a dispute arise.

The principles discussed above may be summarized as follows:

- The contract's first purpose is the success of the project or innovation, which can only be achieved if it is fair and correct and keeps both parties interested in success. This means that it should be balanced.
- The contract should be written in readable, concise language; it should be easily understood and its content should be clear. This means that it should be aptly divided and subdivided with descriptive and indicative subtitles, and carefully enumerated.
- The contract should be precise and leave as little room as possible for alternative interpretations. This requires unambiguous and consistent terms and definitions, with as little uncertainty as humanly possible.
- The contract should consider, and be based on, the process of implementation and should try to take into account what might go wrong and what might happen in the future.

Boilerplate clauses are commonly used. They can be of use but should be carefully checked for their applicability to the situation.

C. Types of agreement

1. Preliminary agreements

(a) *Secrecy agreements*

The two essential terms of a preliminary secrecy agreement are undertakings by the prospective licensee:

- Not to communicate or disclose know-how obtained during the preliminary negotiations
- To use it only for the purpose of assessing the desirability and value of a licence

Types of agreement

- Preliminary agreements
- Intellectual property rights agreements
- Developments and collaboration agreements
- Implementation agreements

Preliminary agreements

- Secrecy agreements
- Evaluation and non-analysis agreements
- Option agreements

Intellectual property rights agreements

- Patents
- Know-how/trade secrets
- Hybrid
- Trademarks and franchises
- Copyrights

A preliminary disclosure agreement may also be concluded, individually or jointly, with selected employees of the prospective licensee or technology recipient. The agreement may call for an initial evaluation of the information by one individual of suitable standing selected by the prospective licensee. The initial evaluator then advises on the basis of the information received whether or not the technology is of interest. If it is not, the evaluator agrees not to disclose the information received; if it is, the potential licensee, as well as the initial evaluator, agree not to use the information and to restrict its disclosure until an agreement is executed establishing the terms and conditions for its use and the acquisition of the technology.

(b) *Evaluation and non-analysis agreements*

Evaluation and non-analysis agreements are specific secrecy agreements where the receiving party specifically agrees not to analyse the composition of compounds or products handed over to them. Such agreements are widely used in the chemical and plastic industries.

All the other provisions of a secrecy agreement also apply.

(c) *Option agreements*

Where preliminary trials or investigations as to the viability and value of know-how are to take place, involving the disclosure of secret know-how, an option agreement is frequently deemed necessary and preferred, in particular by the prospective licensee, over a simple preliminary agreement.

An option for a licence is a promise by the prospective licensor to the prospective licensee to grant a licence if so requested, on specified terms within a specified period or on the occurrence of a specified event. The important point is that at least the main terms of the licence must be specified in the option agreement; otherwise, the prospective licensor would only have to include impossible terms in the eventual offer to make the option ineffective and worthless.

It is, therefore, suggested that an option agreement should be drawn up in two parts, the first containing the terms and conditions of the option, and the second consisting of the full licensing agreement as it is intended by the parties to become immediately binding on the exercise of the option in the prescribed manner. This enables both parties to know precisely what it is that forms the subject matter of the option and avoids delay and possible contention after the licensee has been given secret know-how that may then become vulnerable to infringement.

2. Intellectual property rights agreements

(a) *Patent licence agreements*

The pure patent licence agreement grants rights to a patent(s) only. No technical assistance, know- how, trademarks, machine sale or other technology or IP rights are included. The patent rights can be restricted in a variety of ways.

The patent agreement

Restrictions and rights for each patent of the patent family licensed:

- To territory
- To quantity
- To make, to have made, to use, to sell
- Time-span
- Exclusivity
- Validity claims
- Protection from infringed use

A distinctive element of a pure patent licence agreement involves the handling of royalty rates. A patent owner can freely negotiate royalty rates that apply in an agreement, but the payment obligation ceases when the patent(s) expires, becomes invalid or terminates for any reason.

(b) *Know-how agreements*

The pure know-how licence agreement has several distinctive features:

- Secrecy
- Continuing royalty payments

Know-how rights licence

- Special and important technology transfer instrument
- Technology evolution has created rights
- Trade secrecy laws protect disclosures
- No international convention protection
- Wholly contractual between parties
- Only part of the know-how may be wholly "secret"
- The licence is only for specific use

- Technical assistance
- Improvements
- Machinery

Secrecy. The information transferred to the licensee must be kept secret. Consequently, the confidential disclosure and secrecy provisions of the agreement are very important. It may be necessary for the potential licensee to obtain enough of the confidential information for a proper evaluation of the suitability and worth of the know-how before the agreement is finalized. In such cases, a preliminary confidentiality or secrecy agreement is first consummated. This may or may not entail a disclosure fee.

Continuing royalty payments. Unlike a patent licence, no specific term applies to royalty payments for know-how other than the term agreed to by the parties to the agreement as long as the information remains secret.

Technical assistance. Very often know-how agreements include training in the use of the information through visits to the licensor's plant(s), direct assistance at its own location(s) and ongoing consultation rights. Such assistance ensures that the licensee will be able to successfully implement the licensed know-how in its operations.

The exchange of information will almost always include both confidential and non-confidential information. Accurate records must, therefore, be kept to ensure that both parties agree to what portion of such information represents the "secret" know-how.

Improvements. Rights to ongoing improvements are not automatically included. Their inclusion should be negotiated before finalizing the agreement.

Machinery. The elements of a know-how agreement are often embodied in a piece of manufacturing equipment. Although all of the terms and specifications for the machine can be made part of the agreement, they are best handled in a separate purchase contract that is kept subject to all of the know-how agreement's provisions. The know-how aspects of the machinery itself should be shown in the know-how agreement.

(c) *Hybrid agreements*

The hybrid technology transfer agreement grants rights to more than one intellectual property type in the same agreement. The most common form of hybrid agreement covers both a patent or patents and know-how. It is not uncommon for such a licence also to include trademark rights. In some instances, it will be appropriate to cover rights to patents and know-how in the same document. The treatment of hybrid licences, however, varies considerably from one jurisdiction to another in what concerns the consequences of expiration or invalidity of licensed patents and the duration of the agreement.

Any royalty issues in a hybrid licence should be resolved at the drafting stage, for example:

- Differentiating between patent and know-how rights
- Allocating royalties between patents and know-how
- Providing for a diminished royalty rate or abolition of royalties if the patents terminate or are declared invalid

- Providing for a diminished royalty rate or abolition of royalties if pending or contemplated patents are not issued

- Possibly change the exclusivity provisions of the licence when the patents expire or are declared invalid

The above concern may also affect the duration of a hybrid licence. When only one duration must be shown for patents and know-how, the duration for running royalties will, in principle, not exceed the duration of any licensed patent.

Hybrid agreement checklist

1. Preliminary statements
   - 1.1. Identification of the parties
   - 1.2. Purpose
   - 1.3. Effective date of the agreement
   - 1.4. Place where the agreement is made
   - 1.5. Whereas clauses (recitals, preamble)
     - 1.5.1. Licensor representations
     - 1.5.2. Licensee representations
     - 1.5.3. Background of the agreement
   - 1.6. Definition of terms
2. Subject matter of the licence: the licence grant
   - 2.1. Patent rights
     - 2.1.1. Exclusivity
     - 2.1.2. Territory
     - 2.1.3. Rights conferred
     - 2.1.4. Limitations
     - 2.1.5. Maintenance and prosecution
     - 2.1.6. Infringement
       - 2.1.6.1. Licensed patents
       - 2.1.6.2. Suits against the licensee
     - 2.1.7. Patent marking
   - 2.2. Know-how/trade secrets/confidential information
     - 2.2.1. General
     - 2.2.2. Know-how grant
     - 2.2.3. Secrecy
     - 2.2.4. The licensee's use of the know-how
   - 2.3. Technical assistance
     - 2.3.1. Plant visits
     - 2.3.2. Direct assistance
     - 2.3.3. Consultation
   - 2.4. Improvements
     - 2.4.1. General
     - 2.4.2. Improvements grant
     - 2.4.3. Timing of the disclosure
     - 2.4.4. Grant back of the licensee's improvements
   - 2.5. Sub-licence rights
   - 2.6. Payments
     - 2.6.1. Initial payment
     - 2.6.2. Royalties
     - 2.6.3. Separate payments for patents and know-how
     - 2.6.4. Tangible items
     - 2.6.5. Acquisition of machinery
     - 2.6.6. Technical assistance
     - 2.6.7. Payment method
     - 2.6.8. Interest on overdue payments
     - 2.6.9. Licensee records
   - 2.7. Term of the licence agreement
     - 2.7.1. Patent licence
     - 2.7.2. Know-how licence
3. Boilerplate provisions
   - 3.1. Termination of the agreement
     - 3.1.1. Overdue payments
     - 3.1.2. Bankruptcy, receivership or insolvency
     - 3.1.3. Expropriation
     - 3.1.4. Change of control
   - 3.2. Effect of termination
     - 3.2.1. Payment due
     - 3.2.2. Technical information
     - 3.2.3. Non-use of the licensed technology
     - 3.2.4. Machinery
     - 3.2.5. Liquidated damages
     - 3.2.6. Survival
   - 3.3. Best efforts
   - 3.4. Most favoured nations
     - 3.4.1. Definition of more favourable terms
     - 3.4.2. Notification
   - 3.5. Warranty and indemnification
   - 3.6. Export control
   - 3.7. Arbitration and applicable law
   - 3.8. Retained rights/rights reserved
     - 3.8.1. Retained rights
     - 3.8.2. Proprietary machinery
     - 3.8.3. Restrictions on use of technical information and patents
     - 3.8.4. Licensee undertakings
   - 3.9. General provisions
     - 3.9.1. Assignment
     - 3.9.2. Severability
     - 3.9.3. Entire agreement
     - 3.9.4. Force majeure, contingencies
     - 3.9.5. Notices

(d) *Trademark agreements*

Unlike patents and to some extent, know-how, which have relatively short lives, a trademark can

Trademark agreements

- Franchise and trademark licences
- Long life of trademarks
- Quality/service implications of trademark
- Registration and validity issues
- Control over licensee product quality
- Franchise—manifold property rights
- Types of franchise agreement

remain in effect indefinitely if it is continuously used and renewed. It is often advisable to have a separate trademark licence as complications may occur when a trademark is included in a technology agreement.

Control of the quality of the goods or services marketed under the mark is an essential part of any trademark licence. In the agreement, the licensor stipulates that the licensee's use of the trademark is subject to the licensor's supervision or approval of product quality. Samples of products produced and marketed by the licensee are routinely collected and examined by the licensor for the purposes of a quality check. A trademark licence is, in effect, a "registered user" agreement.

The trademark licence itself has virtually all of the provisions of a pure patent licence, including the boilerplate terms and conditions. In many countries, however, there can be only one registered user of a trademark, whereas patents can be licensed to more than one party. In addition, a trademark agreement should include provisions whereby the licensor:

- Represents and demonstrates ownership of the mark for the class or classes of goods that are the subject of the licence
- Grants permission to the licensee to use the trademark for the pertinent class of goods
- Ensures that the trademark will be kept in force
- Where applicable, undertakes to have the licensee registered (in the appropriate territory) as a permitted (registered) user of the trademark for the licensed goods

Provisions will also be made, as mentioned above, requiring the licensee to maintain the quality standards of the trademarked product and to cooperate with the licensor on means to ensure that those standards are being met. If the licensor wishes to avoid liability for wrongful acts of the licensee, however, the degree of control should not exceed a "minimum" requirement.

The "minimum" or "significant" control issue mandates special care in the drafting of trademark agreements. The legal difference between a trademark and a franchise agreement can be very important in cases where liability includes responsibility for personal damage that may arise from defective products or services.

(e) *Franchise agreements*

Franchising is a method for distributing goods and services based on trademark licensing. A franchise agreement combines a trademark licence with a number of other familiar types of licence, such as a know-how and trade secret licence, a copyright licence and a distribution agreement.

Each party to a franchise has several interests to protect. The franchiser's include receiving agreed upon payments; protecting the goodwill, image and integrity of the franchise; promoting opportunity to the fullest extent in the designated territory; and retaining complete ownership of the trademarks, service marks, logos, trade names, copyrights, technical and operating know-how, and trade secrets used in the franchise. For present purposes, all of the terms mentioned are included when the terms "trademark" or "mark" are used.

Beside the right to operate under the valued trademark, the other primary interests of the franchisee include management assistance and support in operating the franchise optimally, the right to acquire the needed raw materials and services used in the franchise at lower cost and the right to continue the franchised operation within a territory by complying with reasonable requirements of the franchiser.

The principal elements of a franchise agreement include provisions for:

- Licence to use the franchiser's mark.
- Territory of the licence. A franchiser may be able to constrain manufacture of the trademarked product, but may not always be able to regulate the area of sale. Assurance of territorial protection requires careful study.
- Protection of the mark.
- Quality control.
- The timing and amount of payments.
- Capital, suitability of the premises and insurance.
- Settlement of disputes.
- Expiration and termination.
- Renewal of the licence.
- Assignability.
- Indemnification.
- Protection of trade secrets, know-how or any other intellectual property.

(f) *Copyright agreements*

Copyright protection begins as soon as a work is created and fixed in a tangible form of expression from which the copyright may be perceived, reproduced or otherwise communicated. For practical and business purposes, however, a copyright should be registered if it is to be licensed. A licensee of any of the rights to a copyright would require protection from infringement and registration is required for filing an infringement action.

The exclusive rights of the copyright owner may be licensed and owned separately. Thus, the licensor may assign to another any one or more of those exclusive rights, which include the right to reproduce, to prepare derivative works, to publicly distribute by sale, rental, lease or lending, to publicly perform, or to publicly display.

Copyright agreements

- Creating copyright rights
- Registration: creating right to licence
- Assignment of copyright rights
- Infringement protection to licence
- The licence agreement
- Software and multimedia licensing

3. Development and collaboration agreements

Development and collaboration agreements will be dealt with in much more details in other modules of the present course. They consist primarily of joint research agreements, joint development, equity participation and joint venture, as discussed below.

Development and collaboration agreements

- Joint research
- Joint developments
- Equity participation
- Joint ventures

Development and collaborative agreements

- Generally include an intellectual property rights agreement
- Clearly define divorce or ending clauses
- Created intellectual property rights

(Refer to other modules of the course.)

(a) *Joint research agreements*

Both parties agree to share in the research. Such types of agreement usually address novel technical fields where the research effort is considerable and the risk high. Heavy emphasis is placed on the IP rights emanating from the research work, including patent prosecution and ownership, rights to use and licence.

(b) *Joint development*

Such agreements typically cover technologies with multiple applications. Each party agrees to focus on its own expertise to develop the final product or service. The initiator of the request usually has the base technology. IP rights, as in joint research agreements, are clearly defined.

(c) *Equity participation*

Equity participation is used frequently when risks or costs are high, where the licensor would not be satisfied with returns purely associated with licensing fees or through government edicts.

(d) *Joint ventures*

The joint venture is a specific type of equity participation with usually more restricted scope.

Joint research, joint development and, to a lesser degree, joint ventures usually have a finite life. It is, therefore, very important to clarify what rights will remain at the end of the contract.

4. Implementation agreements

(a) *Technical service and assistance agreements*

When technical services in technology transfer embody "proprietary know-how", the description of the technical assistance to be provided is usually included in the know-how agreement. There are situations, especially in developing countries, where a technical assistance agreement does not contain proprietary know-how.

Implementation service agreements

- Technical service and assistance
- Engineering services
- Management services
- Supply and off-take agreements

An operating company may require technical assistance in a mature industry, such as the manufacture of cement, metal cans, glass bottles or timber products. The supplier's input of services could include plant layouts, lists and specifications of equipment, product literature and sales aids. Managerial inputs may include providing expert services in training the recipient's personnel in production management, coordinating supplies with plant erection, quality control and the like. This type of assistance is often aptly referred to as "show-how".

Show-how is a teaching or technical support service, as that offered by consulting engineers when they are using the common knowledge of the art to advise a client. It contrasts with doing engineering design work that includes proprietary know-how. The value of show-how can be great. The assistance rendered a manufacturing company can enable the recipient to establish efficient, economical production and effective, profitable market penetration much sooner than the company could do on its own.

Where a technical assistance agreement is associated with other technology transfer agreements, such as a know-how licence or an engineering design contract, it is best to link the agreements by referring to them in the technical assistance agreement, even if there are different contracting parties. By such cross-referencing, later conflict can be minimized.

The provisions of a technical assistance agreement must be tailored to fit the specific needs of each agreement. They generally include:

- Definitions of product: product design, specifications, quality, as applicable
- Plant capacity

- List and description of all the supplier's services, such as supply of technical personnel, training, quality control procedures, testing services, ongoing consultation, literature preparation, productivity or costs standards and sales or marketing information
- Product/process improvements when included in the agreement
- Costs for use of supplier's personnel
- Performance warranties
- Supplier's liability related to plant performance
- Payment by the client for services
- Linkage to other agreements, when applicable
- Governing law of the agreement

(b) *Engineering service agreements*

The engineering contract is based on a situation that often occurs in a developing country: the engineering firm executes a design and construction agreement in which the client legally discloses to the engineering firm know-how acquired from a process licensor, performs and assumes full responsibility for all non-specialized work either directly or by using local agencies, and independently transacts with the process licensor and the engineering firm for performance guarantees relative to their areas of work.

In such a context, the objective of the client is to establish a manufacturing plant at its estimated cost that will make a product at a certain volume and cost and meet a prescribed standard of operation by a given date. To achieve that objective, the client has to contract with both the process licensor and the engineering firm for scopes of services and responsibilities that reinforce each other and do not conflict.

The agreement assumes that the engineering firm will undertake all major procurement. It further assumes that a process industry is the objective of the client. The engineering company, based on know-how revealed under secrecy, defines in a proposal the overall project, its principal services (design, procurement, construction, plant commissioning, etc.), major equipment required, the time to completion and the approximate cost. The proposal specifically states the services to be performed by the engineering company and what services the client will perform, directly or by subcontracting. Upon concurrence of the parties, the formal, detailed agreement is then drafted.

General structure

- Parties to and intent of the contract
- Rights and capacities of technology owner
- Grant of rights and duration
- Obligations of the transferor
- Obligations of the transferee
- General conditions of the contract
- Dispute settlement and governing law

(c) *Management services*

Management services are often obtained in connection with the setting up of new facilities. Management services enable the buyer to operate the "ready" facility efficiently with its own staff as soon as possible and to make further management assistance unnecessary.

(d) *Supply and off-take agreements*

Supply and off-take agreements are generally integrated in large-scale high-capital projects.

In supply agreements, the licensor agrees to supply some key raw materials to the licensee for a limited and specified time under clearly defined financial conditions.

For off-take agreements, the licensor agrees to purchase a portion or the totality of the output of the new product.

Often, the financial terms are favourable for the licensor and are negotiated as a partial payment for the technology.

D. Structure of a technology transfer agreement

1. Overview

An agreement is a record of a transaction. It spells out:

- The exact identity of the parties
- The subject matter of the licence
- The licensor's obligations
- The licensee's obligations
- The obligations common to the parties

A licence agreement should contain the following sections:

- *Preliminary statements*. Preliminary statements contain the identity of the parties, the purpose of the agreement, pertinent background leading to the licence, the effective date and the definitions of the key terms of the agreement.

- *Subject matter*. Subject matter is the heart of the licence agreement. It contains the grants of the patents. It also contains, when appropriate, terms and conditions of the know-how rights (including trade secrets, technical assistance, improvements on the technology, payments and the term of the licence).

- *"Boilerplate"*. "Boilerplate" is commonly used to describe the detailed operational obligations of the licensor and the licensee, as well as obligations that are common to both. Such operational agreements include the provisions for governing law, reporting responsibilities, notices, assignment and so on found in almost all licence agreements.

Incorporating all of the above into a clear, legally binding agreement requires the careful drafting of a licence. Not all agreements require all the paragraphs and clauses shown below, while others may require special clauses not covered.

Preliminary clauses

- Parties involved
- Purpose—vision
- Effective date
- Background of agreement for both parties (recitals)
- Place of agreement and authority signatures (usually at the end)

There is no precise international format for drafting licence agreements, since procedures as well as content vary from one country to another. As readers review the present chapter, they should decide which elements best fit the objectives of their own licensing programme. To assist decision-making, explanatory and cautionary comments are provided.

2. Preliminary statements

(a) *Identification of the parties*

The opening paragraph should identify the parties to the agreement with their official names, addresses and, when applicable, the location of their governing law of incorporation. Corporations should be identified as parent and subsidiary, parent or subsidiary alone, and their legal capacity or authority should be given.

Specifying the parties to the agreement ensures the precise identification of the licensing and licensed parties. For the licensor, this precludes the possibility of extending the licence beyond the intended entity or not including all of the intended entity. For the

Preliminary clauses—definitions

- Patents
- Know-how
- Improvements
- Product/services
- Net sales or other
- Field and geography

licensee, it ensures that the identity and commitments of the licensing party extend to the entire intended entity.

(b) *Purpose*

The purpose of an agreement should be stated in a brief paragraph that captures the essence of why the licence agreement is being executed. A statement can also be made on the economic reason for the contract.

(c) *Effective date of the agreement*

The date when the agreement comes into full force and effect also must be specified clearly and may come before or after the date when the agreement is signed. The effective date is sometimes defined in the definitions section of the agreement when conditions prevent showing just the date itself.

Some countries require government approval after the parties to an agreement have agreed on all of its provisions and executed (signed) the document. In those cases, the date of government approval usually becomes the effective date.

(d) *Whereas clauses (recitals, preamble)*

The whereas clauses give the background and rationale for the agreement. They should be worded carefully to clarify the terms and conditions for people from either party who were not involved in making the agreement but who are asked at a later date to settle conflicts between the parties.

Clarity is also important in the event legal action is taken by one party against the other. In a court of law, the judge may look to the whereas clauses for a better perspective on clauses that may be difficult to interpret.

Whereas clauses describe such things as licensee and licensor representations and background of the agreement.

(e) *Licensor representations*

Such a clause states that the licensor owns the subject technology of the licence (patents, patent applications, know-how, trade secrets, trademarks and/or copyrights), that it has the right to grant the licence and that it has not granted a previous conflicting licence.

(f) *Licensee representations*

Such a clause indicates why the licensee wishes to obtain rights to the subject technology. When applicable, it also indicates the patents, patent applications, know-how, trade secrets, trademarks and/or copyrights the licensee owns relating to the field of the licensed technology. It is also appropriate to include in the present section any other pertinent information that relates to or could affect the licence.

(g) *Background of the agreement*

When warranted, other clauses should include statements about any prior relationship between the parties and any prior agreements that may relate, dominate or affect in any way the present agreement. Cancelled or suspended agreements should be mentioned as well.

(h) *Definition of terms*

To preclude misunderstandings between the parties, the subject matter and the key words that will have broad impact in the agreement require definition.

"Licensed patents" generally includes the patents, patent applications, continuations, continuations-in-part and divisions that relate to the licensed technology. If the licence includes foreign countries, the definition would then include the foreign counterparts of the patents and applications in each of the countries. If there are several patents, patent applications and so on, they are usually listed in an attached schedule that shows the specific details of each. Typical schedule headings include licensor identification or docket number, patent title, country(ies) where the patent is issued or filed, serial

number, filing date, patent number for those which have been issued and the issue date.

"Licensed know-how/trade secrets" is licensor's information to be transferred to the licensee. The technology included in the know-how should be described in broad terms, but with enough specificity to avoid misunderstandings. Usually, the licensor agrees to communicate to the licensee information in his or her possession, that he or she has a right to divulge, as at the effective date of the agreement. Such information (such as pertinent drawings, manuals, specifications, formulas, etc.) enables the licensee to produce the licensed product or use the licensed process. Sometimes, know-how will include the sale and supply of the manufacturing equipment or apparatus that can be used to manufacture the licensed products, assuming the licensor has such equipment.

"Licensed improvements": if they are to be a part of the licence, it is best to define them clearly in this section. Improvements usually include inventions, technical developments and know-how (including trade secrets), as defined in the agreement that:

- The licensor has or has not obtained the rights to license
- Are patentable or not
- Are developed or acquired during the term of the agreement
- Pertain to the licensed products, licensed process and licensed apparatus
- Have been put into commercial use by the licensor; their inclusion is a major consideration that should be thought out carefully

"Grant-back" is the term used to denote giving the licensor rights to the improvements made by the licensee on the licensed technology. If the licensee is to grant their improvements back to the licensor, the scope of such improvements requires clear definition in the present section. It usually parallels the definition of the term "licensed improvements".

"Licensed product", "licensed process" and "licensed apparatus": the definition of those terms should be tied into the patent rights and into the know-how to be exchanged under the licence. Such definitions usually represent the basis for collection of royalty payments. The patents may cover the licensed product only, while the patents and/or the know-how may cover the licensed process by which the product is made. The patents, the know-how or both can also cover the equipment in the licensed apparatus.

"Net sales": when royalties are based on a percentage of net sales, it is necessary to decide and stipulate what the term means. Often it is gross sales less discounts, commissions, returns, taxes or other credits as intended by the parties to the agreement. Such a definition is obviously very important as it is used in the calculation of royalties to be paid.

"Territory": the geographical area where the licence will be in effect must be specified clearly. Each country must be named. If the rights vary by country as to exclusivity or in any other manner (such as sales rights versus manufacturing rights), showing it in tabular form usually enhances clarity. The patent rights can only be granted in countries where the licensed patents are filed or issued, but know-how does not have a territorial barrier.

The term "subsidiary" refers to a company owned either wholly or in part by another company. The owning company is called the parent company. If the rights granted in the licence apply to a parent company, as licensee, and include its subsidiary or subsidiaries, the ownership (i.e. whole, partial, with voting rights) must be defined. Good practice requires that the licensed party control the subsidiary. For the purposes of the agreement, "control" means the power to direct the management and policies of a subsidiary through the ownership of voting securities, by contract or otherwise. Such a definition applies to the licensor and includes the licensor's obligations under the agreement. It should be clear whether the rights granted are from a parent, a subsidiary or both.

Other definitions: as a licence is negotiated and drafted, additional terms requiring definition will

become apparent and should be added to the definitions section if they are key and apply broadly to the agreement. Otherwise, they should be defined in the first paragraph or clause in which they are mentioned.

3. Subject matter of the licence: the licence grant

The grant is probably the most important part of the licence. Its provisions, outlined below, require careful thought as to their content. They should be drafted unambiguously so there is no doubt or open question regarding the rights being granted.

Scope—grants

- Grants given and accepted
- Limitations and restrictions
  - Field
  - Geography
  - Time and duration
  - Volumes
  - Terminal rights

Scope—exclusivity

- Types
  - Exclusive
  - Sole licence
  - Non-exclusive

(a) *Patent rights*

The term "licensed patents" should be defined in the agreement in order to identify the patents, applications and so on that are included in the licence. Such items should be shown clearly in a schedule attached to the licence agreement. The same would apply for each country in the licensed territory.

(b) *Exclusivity*

The grant can be exclusive, sole (exclusive except for the licensor) or non-exclusive. Sometimes exclusive or sole licences have a limited time period of, perhaps, three or five years, and then become non-exclusive. The governing factor for the licensor is to determine the goals for optimizing the returns from the licensor's own use and/or the sale of the technology rights and then to determine if such goals can be meshed with those of the licensee. The licensee seeking an exclusive licence must be prepared to make a strong case for his or her ability to market the technology in the licensed territory aggressively.

The exclusivity decision for a licensor can be very complicated, especially if the patents extend to foreign countries. It requires careful study of which approach will yield the greatest return and what is allowed legally.

(c) *Territory*

The territory clause defines the countries and territory of the grant.

(d) *Rights conferred*

The grant should set forth exactly what a licensee is free to do under the patent rights. Depending upon the claims in the patents, the licensee can be given the right to manufacture, have manufactured, use and/or sell the subject matter of the licence.

(e) *Limitations*

The licensor may impose limitations beyond the geographical territory, such as quantities (maximum, minimum) and field of use. Restrictions on the field of use are sometimes applied to licences of technologies that have many or several uses. In that event, the licensee may be given the right to practise the technology for one or more, but not all, of the applications. Restrictions have to be balanced between the aims of both the licensor and the licensee and the payments.

(f) *Maintenance and prosecution of the patents*

The licensor usually bears responsibility for the cost of filing, prosecution and maintenance of licensed

patents. This includes future patent applications if improvements are included in the agreement.

The future patents, when offered to and accepted by the licensee, become part of the licensed patents and are subject to royalty payments. Therefore, future patents can add to the term of agreements written for the life of the patents. The licensee should understand such a consequence before requesting or accepting such responsibility. On the other hand, often the licensee is not given the right to apply for any patent, anywhere in the world, covering any invention disclosed to it under the agreement, without the licensor's permission.

(g) *Infringement*

The licensor will want the licensee to advise, in writing, of any infringement the licensee discovers.

The licensor will also want the right to sue the infringing party to recover damages after assessing the facts of the alleged infringement. The licensor usually has the right to choose and control the counsel selected for prosecution of the suit and will insist on full cooperation by the licensee.

Damages collected in such a suit usually pay the litigation expenses of the licensor and the licensee on a pro rata basis. The parties then divide the remainder between them if the infringement caused significant damages to the licensee.

The licensor will also want to control legal action by the licensee against an alleged infringer. After looking into the facts carefully, the licensor may decide against filing suit. Then the licensee is often given the right to pursue a suit on its own.

The agreement should stipulate the handling of patent suits against the licensee by third parties. In many agreements, the licensor will not warrant the validity of the licensed patents, nor will it assume an obligation to defend or indemnify the licensee against a third party suing the licensee for infringement of the third party's patents. When the licensor agrees to defend a licensee, the parties generally split the actual litigation expenses or the licensor agrees to pay up to a certain percentage of royalties collected from the licensee at the time of the suit. The licensor, when participating in the suit, almost always retains the right to choose and control counsel for the defence.

Awards in favour of the licensee usually first pay the litigation expenses of the parties on a pro rata basis first. The surplus, if there is one, is then split between the parties.

(h) *Patent marking*

The licensor often insists on requiring the licensee to mark licensed products that are patented with the patent number. In the event of an infringement, such identification will be needed to collect damages for the period prior to giving notice of the infringement to the infringer.

(i) *Know-how/trade secrets/confidential information*

Know-how alone can be the basis for a licence agreement. In such a case, the technology transfer licence will have no references to patents. However, when know-how exists along with patents, both are generally included in one licence agreement. Including the know-how can be especially important to a licensee receiving a new product or process.

To the extent possible, know-how disclosures should be in writing. Very often the agreement will allow conferences, plant visits and the like. In such cases, the substance of oral disclosures should be confirmed in writing within a stipulated time period and made a part of the record of transferred know-how.

In drafting the know-how section, the licensee must ensure more than just the transfer of information. Show-how provisions wherein the licensor agrees to demonstrate how to use the technology correctly are also vital.

(j) *Secrecy*

In all instances, the licensor should insist that all know-how, without limitation, be held in confidence.

Suitable wording for that portion of the agreement is common and readily available, but careful attention should be given for exceptions to the confidentiality provisions, which usually cover confidential information that:

- The licensee can prove, with written records, or is already known to or already in the possession of the licensee
- Is in the public domain prior to disclosure by the licensor
- Becomes a part of the public domain by publication or by any other means except an unauthorized act or omission by the licensee
- Is received from third parties that are under no obligation to maintain such information in confidence
- The licensee can prove, with written records, was developed by licensee independent of disclosures from licensor

Obligations of secrecy usually continue beyond the term of the agreement.

(k) *Licensee's use of the know-how*

The agreement should provide conditions giving the licensee the right to disclose any portion of the know-how. Any restrictions the licensor requires on disclosures within the licensee's organization, to suppliers or to customers would be included here.

The agreement may spell out the basis on which disclosures can be made to include a requirement that the licensee execute confidentiality agreements with the pertinent employees and third parties.

(l) *Technical assistance*

Technical assistance can greatly reduce the time required by the licensee to get the licensed technology into production. Common elements of technical assistance include plant visits, direct assistance and consultation.

(m) *Improvements*

If the parties decide to include improvements made after the effective date of the agreement, the drafting of the present section must be handled carefully. It is necessary to stipulate the rights to licensor improvements in the grant and to allow for their use as well. Improvements should be subject to the same secrecy obligations imposed for the know-how and confidential information disclosed during the agreement. Improvements made by the licensee to be granted back to the licensor require a separate clause to specify how they are to be handled.

(n) *Timing of the disclosure*

To avoid premature disclosure, it may be advisable to provide that disclosure be made after filing of a patent application or after first commercial use in the case of unpatented improvements. A delay in disclosure is needed to avoid loss of patent protection and to allow time to determine that an improvement will be truly useful, rather than one that will be abandoned after closer study of its value.

(o) *Grant-back of improvements made by licensee*

Subject to antitrust laws, the licensor generally wants such a provision obligating the licensee to give the licensor rights to improvements, patentable or otherwise, made by the licensee during the term of the agreement.

The provisions with respect to definition and timing of disclosure for improvements are commonly reciprocal between the licensor and licensee.

(p) *Sub-licence rights*

Should the parties agree to allow sub-licensing, the main agreement should specify the rights and obligations of the licensor and licensee with respect to the sub-licensee.

The licensor generally makes the licensee responsible for ensuring that the sub-licensee fulfils all the requirements of the principal licence and also for the collection of royalties.

Which party provides the technical assistance to the sub-licensee is another major decision for sub-licences.

(q) *Payments*

In technology agreements, payments usually take the form of a lump sum, a royalty or a combination of both.

Initial payment

Technology agreements frequently involve the transfer of valuable know-how. For that reason, the licensor usually requires a lump sum payment when the licence is executed. The payment should reflect the value of the information to be transferred early in the life of the agreement.

Although advance payment is usually found in agreements that include know-how, it is not unusual for patent licences without know-how to include advance payment as well. It is meant to encourage the licensee to pursue the technology diligently.

The amount of advance payments depends upon several factors:

- An assessment of the value of the technology
- Whether the licence is exclusive, non-exclusive, allows sub-licensing or not
- Whether advance payment of royalties is included
- The rate of running royalties to be paid
- The amount of the ongoing minimum royalties
- The length of payment of royalties

Royalties

Most licences require payment of royalties based on a percentage of the "net sales" of the licensed product. Advance payments are sometimes acquired initially or over a period of time and applied against running royalties. More often royalties are collected at set periods (for example, three months, six months or yearly) based on the net sales for the period immediately preceding.

Exclusive licences commonly contain a yearly minimum royalty provision. They are not uncommon for non-exclusive agreements. The parties generally set the minimums based on a conservative estimate of projected net sales over the life of the agreement. The minimums may not start for an initial period (while the technology is being commercialized). Then the amount increases gradually (for five years or so) up to an agreed-upon maximum. The maximum then generally remains in effect for the life of the agreement.

Minimums in a licence agreement attempt to ensure vigorous effort on the part of the licensee to commercialize the technology. It is possible to provide for termination of the licence if the minimums are not being met or, less stringently, to convert the licence from exclusive to non-exclusive status.

Separate payments for patents and know-how

There are several reasons to separate patent and know-how royalty payments in licence agreements:

- Patent royalties are subject to risk since there is always a chance they can be declared invalid.
- Patent royalties can remain in effect only for the life of the patent, but know-how royalties may continue well after the licensed patents expire.

- The subject matter of the licence with respect to patents is limited to the scope of the claims, whereas the subject matter can be defined more broadly under the scope of the know-how.

- Government regulations provide for different restrictions for patents and know-how.

Tangible items

The agreement should specify how the licensor will bill and collect for any equipment sold to the licensee and for such items as operating manuals, blueprints, drawings, manufacturing specifications, test equipment or devices that are supplied by licensor to licensee. Such charges may apply to quantities that exceed an agreed-upon level to be exchanged initially for no added payment.

Technical services

In addition to the above payments, the licensee may have to pay separately for specific technical services that the licensor may provide in connection with the licence. Such services may be considered under three main headings:

- Training programmes for licensee's personnel

- Specific technical services performed in the licensor's works and facilities, such as special drawings

- Technical experts supplied by the licensor to the licensee's plant

The licensor normally agrees to provide training services free of charge, but the licensee is required to cover the travel costs and living expenses of trainees.

Fees for the second and third headings above normally show the hourly and daily rate for personnel plus all travel and living expenses incurred in the case of direct assistance to licensee's plant.

Payment method

Where it presents a difficulty, the type of currency, exchange control, governmental taxes and other factors have to be considered. The agreement must provide for how payments are to be handled.

Interest on overdue payments

If the licensee fails to make a payment when due, the licence agreement generally provides for interest payments, at a specified rate and in the agreed currency. A rate of 3 to 5 per cent above a recognized banking rate is customary.

(r) Licensee records

The licensee will be required to furnish the licensor with a statement, certified by the licensee's appropriate officer or an independent certified public accountant acceptable to the licensor, showing royalty calculations in sufficient detail for the licensor to ascertain their correctness.

A further provision obligates the licensee to maintain records that will permit the licensor or its representatives to determine that all payments made and due are accurate. Such records should be open to inspection by the licensor or to a third party accounting firm on reasonable notice. If an audit becomes necessary, the agreement should provide for the handling of the cost.

(s) *Term of the licence agreement*

Patent licence

In a patent licence, the term is usually from the effective date of the licence until the expiration of the last of the licensed patents or until none of the licensed patents remains in effect for any other reason (lapsed or declared invalid). In cases where there are no existing patents, but only patent applications, it is common to provide that termination of the licence occur after an agreed-upon time period, unless a patent or patents issue during that period.

Know-how licence

In know-how (or patent and know-how) licences, the know-how royalty period is typically established by negotiation. Some countries limit the term by law. At the end of the term of the know-how licence, a licensee may be given the right to continue to use the know-how on a royalty-free basis or may be denied the right to continued use unless the know-how licence is renewed.

4. Boilerplate provisions

(a) *Termination of the agreement*

Termination provisions vary widely: they can be limited to expiration or invalidity of the patents, to a definite time period for know-how and/or to breach of the agreement by either party. With respect to breach or default, it is common to provide that the licence can be terminated if the breach or default is not remedied within a 60-day period following notice of the offence. Breach or default is usually determined in arbitration or mediation. Often the agreement will include specifically the following conditions as cause for termination: overdue payments, bankruptcy, receivership or insolvency, or change of control.

(b) *Overdue payments*

If a payment remains overdue for a set period, such as 60 or 90 days, the licensor will usually have the right to terminate the agreement.

(c) *Bankruptcy, receivership or insolvency*

Bankruptcy or receivership proceedings may also be cause for termination. Should proceedings take place, by or with the consent of the licensee, that prevent the licensee from paying royalties or implementing the licensed technology, and should those proceedings remain in effect for a specified length of time, such as 60 days or more, the licensor may wish to have the right to terminate the licence at the end of the specified time period.

(d) *Change of control*

With the rise in merger and acquisitions activity around the world, the change of control provision has become very important to licensors.

(e) *Effect of termination*

Following a termination, the licensor will usually want to provide for the remedies listed below:

- Payments due: prompt payment for all money due or accrued.
- Technical information: immediate return of all technical manuals and other resources.
- Non-use of the licensed technology: the licensee is no longer permitted to use any of the licensed patents, know-how or improvements.
- Machinery/equipment: the return of purchased machinery that embodies any of the licensed technology. In such an event, the licensee may be given compensation. The amount of compensation should be stipulated in the agreement, for example, it may be based on the depreciated value of the equipment.
- Liquidated damages: owing to termination, the licensor may have to forego income that cannot be regained easily through licensing to another party or parties following such termination.
- Survival: in this paragraph, the provisions of the effect of termination, secrecy, non-use of the technical information and non-use of the patent sections of the agreement are specifically noted to survive the expiration or termination of the agreement, to the extent permitted by the applicable governmental laws.

(f) *Best efforts*

A paragraph stating that the licensee will use his or her best efforts to exploit the licensed technology is common in both exclusive and non-exclusive li-

cences. It would be desirable for the parties to agree on the meaning of "best efforts", and what may constitute best efforts in terms of specific steps to be taken by the licensee.

(g) *Most favoured licensee*

The most favoured licensee clause provides that, should the licensor grant another licence to a third party on more favourable terms, the more favourable terms will then apply to the first licensee. It is desirable to define what "more favourable terms" means precisely.

(h) *Export control*

If the technology or products made under a licence are considered sensitive, or if they might be utilized in countries to which the licensing country restricts exports, the licensor will require a clause to ensure that such restrictions are not violated. The provision should specifically prohibit the licensee from exporting or re-exporting any of the licensed know-how, improvements, other technical information or products to any such country without prior authorization from the relevant authority of the licensing country.

(i) *Dispute resolution and applicable law*

Mediation and arbitration are being used more and more frequently as a means of resolving licence agreement disputes because they are usually faster, much less costly and more amicable than lawsuits. The parties generally specify that the procedure should be in accordance with the rules of an association appropriate to the geographical areas covered by the agreement.

Dispute resolution

- Mediation
- Arbitration
- Limitations
- Rules of the World Intellectual Property Organization

International bodies such as the World Intellectual Property Organization (WIPO) and the International Chamber of Commerce (ICC) provide mediation and arbitration services worldwide.

5. General provisions

General provisions

- Assignment
- Severability
- Force majeure
- Notices
- Reporting
- Audits
- Governing laws

(a) *Assignment*

It is important for the licence agreement to provide for assignment or to preclude it. Assignment is commonly precluded for the licensee, although there are exceptions. Usually, the licensor will provide that the agreement should be binding and be of financial benefit to any successor to the licensor's entire business (or that part of the business which relates to the licensed subject matter) by merger, consolidation or another means. The same provision would generally apply to the licensee except as subject to the provisions of the section dealing with change of control.

The assignment clause may state, in specific language, that the agreement is not otherwise assignable by either party except by the licensor to an affiliated company of the licensor. Such assignment by the licensor should not relieve the licensor or a successor of his or her obligations under the agreement.

(b) *Severability*

A clause will usually provide that if a significant provision of the agreement is declared void or unenforceable by proceeding, the remaining provisions of the agreement will remain in full effect.

(c) *Entire agreement*

In general, almost all licence agreements contain an entire agreement clause. It is especially important when there are existing agreements or have been prior agreements between the parties related to the current or another subject matter.

(d) *Force majeure, contingencies*

The present clause provides that neither party to the agreement will be responsible for failure or delay in performing its obligations owing to circumstances beyond its reasonable control.

(e) *Notices*

The parties will designate the principal contacts for the handling of correspondence, facsimile messages, telephone calls, notices, royalty payments, technical assistance, training, patent administration and so on.

6. Warranty and indemnification

Many times, a licensor will make no warranty or representation of any kind, express or implied, concerning any matter in the agreement. If the licensee insists, the warranty section may be used to confirm that the licensor:

- Owns or has the rights to the licensed patents.
- Owns or has the right to disclose the licensed know-how and other technical information.

Outline: warranties

- Obtaining assurance—risk element in technology transfer
- What is to be protected?
- Concerns in various forms of technology transfer
- "Warranties" and "guarantees"—basics
- Liabilities and remedies
- Contractual expression

- Has no ongoing, pending or threatened suit regarding the licensed patents and technology (assuming there is one).
- Has used the know-how to enable him or her to produce the licensed product. If there is no licensed product, then some statement that attests to the worth of the know-how should be given.

A warranty is a contractual promise. The individual making the promise is regarded as undertaking contractual liability. This contrasts with mere statements or representations, which are not the equivalent of a promise. The parties to licence agreements are free to structure the warranty provisions in their agreements as they wish, curtailing them only if there are mandatory applicable legal provisions.

If the parties omit to mention warranties in an agreement, a court or an arbitration tribunal with jurisdiction over the dispute will accept their free decision not to provide for warranties. In such a case, they will apply the proper rules of the applicable law to address any omissions.

Technology transfer agreements (patent, trademark and know-how agreements) are considered "risk" contracts.

In the area of warranties and guarantees, the risk element is especially accentuated because it is largely up to the parties to set the scope and the limits of their rights and obligations. Many legal systems are silent on the warranties that a licensor should extend to his or her licensee.

(a) *Warranties in patent licence agreements*

The common warranties in an exclusive patent licence agreement refer to the following matters:

- *Legal status of patents*: The first warranty expected is that a patent exists and is legally valid. Of course, a patent may not yet be granted, but only applied for or requested. In such a case, the licensor should warrant the exact and described legal status of his or her patent application or have it "laid open for public inspection".

If a patent has been granted, the licensor should also warrant that he or she has an unhindered right to grant the patent licence, that there are no mortgages or pledges of third parties on the patent right or that the patent is not dependent on some prior patent or on a utility model. If there is a prior right to use the patent, the licensor is expected to inform the licensee about it.

An essential feature of patents is that they are valid only in countries where they have been properly registered. Warranties concerning the legal status of a patent should include the obligation of a patent holder to register the patent in the territory where a licence is granted and to maintain its registration. A licensor is not responsible for the future validity of a patent, but the parties may consider the consequences of a subsequent invalidation of a patent. The usual remedy in such cases is contract termination.

Most licensors would not assume liability for damages. The licence contract remains operable until the patent is finally revoked.

The costs of maintaining a patent normally fall on the licensor. However, if there is an exclusive patent, the licensor may request the licensee to bear the cost of patent maintenance.

- *Technical applicability and usefulness of patents*: Generally, a licensor is responsible for the technical applicability and usefulness of an invention but not for the commercial profitability of products based on it.

Licensors often tend to disclaim any responsibility for the legal and technical deficiencies of their patents. If the parties wish to specify the licensor's warranties for technical usefulness, the latter should be written precisely and specifically. The parties should describe the technical function for which the patented technology will be used and any testing that demonstrates the patent's usefulness. If a licensor warrants the technical usefulness of a patent, a licensee is entitled to terminate the agreement if such usefulness cannot be demonstrated. Similarly, if the patented technology is inoperable, the licensee may terminate the agreement.

- *Commercial exploitability of the patent*: In principle, the risk of commercial exploitation and profit making should be borne by the licensee. Licensees may negotiate for the right to terminate an agreement when continued working of the patent represents an undue burden. Such situations may arise when continued production would mean excessive costs or when production becomes unprofitable, economically unreasonable or impossible.

- *Third party infringements*: In any patent licence, the possibility exists that the activities conducted under the licence could infringe patent or other rights of third parties. However, seldom will a licensor agree to indemnify the licensee against such infringement possibility. Licensors are reluctant to undertake such a warranty because they rarely are in a position to know or foresee the nature of a licensee's future activities, nor do they have control over such future activities. For that reason, they are unable to evaluate the magnitude or risk in extending an indemnity obligation.

(b) *Warranties in know-how licence agreements*

Know-how may be secret or non-secret. If the know-how is secret, licensors want to be sure it is not revealed to third parties because it would lose its value. A know-how licensor may extend warranties in two specific areas: *(a)* a warranty that the know-how has certain technical properties; and *(b)* a warranty that using the know-how will not infringe the industrial property rights of third parties.

In know-how licence agreements, the following areas may contain explicit warranties from the licensor:

- *Accuracy and completeness*: It is usual to demand from the licensor a warranty that the technical information supplied under the know-how licence agreement is complete in terms of what has been described and promised and that it is complete in the sense that it contains all the information necessary to achieve the anticipated

results. This is not a warranty of results but a guarantee for accuracy and completeness of the delivered material.

Owing to the intangible character of some technology, there may be a problem in defining completeness, in particular when the technology is not documented. In such cases, additional measures may be needed to ensure completeness, such as visiting the plant or receiving training.

In the same manner, a warranty of accuracy of the supplied information may also be requested. This means the licensor must ensure that the technical information supplied under the agreement does not contain errors, mistakes, omissions and similar shortcomings.

- *Stage of technical development*: The licensor should indicate whether the know-how he may be supplying is the latest technology or an older technology.

- *Adequacy and suitability for specific production*: There is nothing to prevent a licensor from warranting the suitability of its know-how for certain technological requirements of the licensee. In cases of such warranty, the licensor will attempt to become acquainted with the circumstances and other relevant technical and environmental conditions under which the licensee will apply the know-how. The warranty of suitability implies not only that the technology is applicable but also that it is technically suitable.

- *Third party infringements*: If a know-how agreement is based explicitly on secret knowledge, the licensor warrants, even without any specific provisions in that respect, that the knowledge is secret and is not known to third parties. To protect the secret of privileged information contained in the know-how, licensors may bind their own employees not to reveal the secrets to any third party. Likewise, they can contractually oblige licensees not to reveal to any third party know-how secrets, including all technical drawings, plans, maps and so on.

- *Warranty of results*: In a warranty of results, a licensor warrants the licensee to achieve specific results by applying the delivered know-how. Such a warranty has to be proved by obtaining the results produced when using the technology.

- *Warranty against infringement*: Although know-how is not protected, its use may infringe the industrial property rights of third parties. If the licensor is not sure whether the know-how is infringing some industrial right of others, it may warrant that it has no knowledge that third parties' industrial property rights could be infringed by the use of the know-how.

(c) *Warranties in trademark licence agreements*

Trademark licensing contains considerably fewer warranties and guarantees of the foreign licensor than patent and know-how licensing. Trademarks generally denote the product's origin and do not have as finite a character as the technical information contained in patents.

In many cases, trademarks are tied to patent and know-how licences or they may constitute one element of another kind of technology transfer agreement.

Warranties in trademark agreements could cover the legal status of the trademark, with no special warranty of results. They usually warrant that the trademark has been properly registered and that its registration will be maintained in force throughout the duration of the agreement.

At the same time, the trademark ownership should be duly recognized and not be subject to any sort of qualifications.

A trademark licensor will almost never warrant the quality of any product produced by a licensee. In most cases, the licensor retains the right to control products manufactured under the licensed mark.

(d) *Warranties in other agreements*

As already mentioned, there are alternative means for transferring proprietary technology, including, but not limited to, a simple sale of machinery and equipment, turnkey arrangements, foreign investments and management agreements.

- *Warranties in sale transactions*: Warranties in a sale transaction tend to be limited to the quality and quantity of goods comprising the transaction. If machinery and equipment are being sold, the warranties form on the quality of goods and the ability of the equipment to perform the functions and operations for which it has been manufactured. In an outright sale, there are no warranties for the transferred technology.

- *Warranties in turnkey arrangements*: The subject of a turnkey contract is usually a whole plant, including the individual pieces of delivered equipment and machinery. Such contracts warrant that the plant will function and perform according to the warranted parameters.

- *Warranties in engineering contracts*: The warranties that engineering firms undertake vary depending on the type of obligations they agree to assume. If the subject of the contract is to provide technology through licensing or to provide management or training services, the parties must agree on the scope of the warranties. If the agreement is a turnkey one, the warranties shall be as described above. In combined turnkey/technology transfer/technical service agreements, the warranties reflect the warranties typical of such contracts.

- *Warranties in management contracts*: The purpose of management contracts is to assume certain management functions for one party. In such an arrangement, a management contractor warrants the performance of the management functions. Within those functions, the contractor may be obliged to transfer know-how and technology to the recipient.

If the parties to a management agreement wish to achieve the transfer of specific know-how, they may prefer to conclude a separate transfer of know-how agreement.

- *Warranties in joint venture agreements*: Joint venture agreements represent a form of foreign direct investment. Foreign investments may be in a tangible or intangible form. Most often rights owned by foreign investors are industrial property rights such as patents, trademarks or know-how.

If the investment does not comprise industrial property rights, it is likely that a foreign investor will invest tangible assets, such as money or machinery and equipment. In such cases, it is also very likely that a foreign investor will conclude a separate contract for technology transfer with a local partner or with the newly established joint venture company.

In the first case, that is, when industrial property rights are invested as capital, foreign investors are expected to warranty certain properties of the transferred technology just as if the technology were being transferred under a separate contract. Local recipients of foreign technology are entitled to expect the same quality and protection regardless of whether a technology is invested as capital or is licensed under separate contract.

TECHNOLOGY TRANSFER OPERATIONS
AGREEMENTS

- General principles
- Structure of agreements
- Clauses

(Drafting exercises)

TECHNOLOGY TRANSFER OPERATIONS
AGREEMENTS

General principles of contract drafting

- Why an agreement?
- What type of agreement?
- What are the issues?
- Take the business approach
- Negotiate before you draft
- Use a mirror
- Big issues first
- Make use of the appropriate resources
- Be flexible
- Take your time

TECHNOLOGY TRANSFER OPERATIONS
AGREEMENTS

Process

A well established process is needed:

- Contamination
- Stakeholders' interests
- Checks and balances
- Continuity of purpose
- Management buy-in
- Minimize resources
- Communication

TECHNOLOGY TRANSFER OPERATIONS
AGREEMENTS

Agreement timing

- Prepare before you negotiate
- Negotiate before you draft
- Plan before you sign
- Maintain contact after you sign

TECHNOLOGY TRANSFER OPERATIONS
AGREEMENTS

Reasons for licensing

- Optimize technology return: licensing as a business
- Strategic decision
- Entering or exiting a business
- Freedom of action
- Forced to license
  - Protect sales or raw material position
  - Law

TECHNOLOGY TRANSFER OPERATIONS
AGREEMENTS

Licensing process steps

Input	Output
• Need identification	• Invention
• Sourcing	• Secrecy agreement
• Assessment	• Option agreement
• Negotiation	• Agreement
• Financing	• Management approval
• Transfer of technology	• Review of documents, intellectual property
• Implementation	• Amendment—royalty reports
• Termination	• Amendment

TECHNOLOGY TRANSFER OPERATIONS
AGREEMENTS

Licensing steps

- Identify the technology
- Evaluate its potential
- Identify targets
- Negotiate the agreement
- Transfer the technology
- Monitor the licence
- Terminate the deal

TECHNOLOGY TRANSFER OPERATIONS
AGREEMENTS

The win-win approach

- The contract should be correct, fair and balanced
- Play role reversal games
- What could reasonably go wrong?
- Preventing litigation
- Close post-agreement cooperation
- The contract is only as good as the parties who are willing to implement it

TECHNOLOGY TRANSFER OPERATIONS
AGREEMENTS

Contract features

- Each contract is unique—think it through
- Have clear achievable objectives
- Note the differences in common law and civil forms of contracts and their implications
- Select appropriate contract types: trademark, know-how, patents, technical services and so on

TECHNOLOGY TRANSFER OPERATIONS
AGREEMENTS

Contract characteristics

- Correct, fair and balanced
- Homogeneous
- Complete but not nit-picking
- Minimum requirements and conditions
- Anticipates major potential problems
- Unique
- Clear and consistent
- Understandable by a layperson

TECHNOLOGY TRANSFER OPERATIONS
AGREEMENTS

Drafting the contract

- Who drafts the agreement, the licensor or the licensee?
- The drafting team—and the main drafter
- Contract sequences in the implementation process
- Drafting checklist
- Role of recital clauses
- Importance of definitions
- Mind the boilerplate clauses

TECHNOLOGY TRANSFER OPERATIONS
AGREEMENTS

Types of agreement

- Preliminary agreements
- Intellectual property rights agreements
- Developments and collaboration agreements
- Implementation agreements

Preliminary agreements

- Secrecy agreements
- Evaluation and non-analysis agreements
- Option agreements

TECHNOLOGY TRANSFER OPERATIONS
AGREEMENTS

Intellectual property rights agreements

- Patents
- Know-how/trade secrets
- Hybrid
- Trademarks and franchises
- Copyrights

TECHNOLOGY TRANSFER OPERATIONS
AGREEMENTS

The patent agreement

Restrictions and rights for each patent of the patent family licensed:

- To territory
- To quantity
- To make, to have made, to use, to sell
- Time span
- Exclusivity
- Validity claims
- Protection from infringed use

TECHNOLOGY TRANSFER OPERATIONS
AGREEMENTS

Know-how rights licence

- Special and important technology transfer instrument
- Technology evolution has created rights
- Trade secrecy laws protect disclosures
- No international convention protection
- Wholly contractual between parties
- Only part of the know-how may be wholly "secret"
- The licence is only for specific use

TECHNOLOGY TRANSFER OPERATIONS
AGREEMENTS

Copyright agreements

- Creating copyright rights
- Registration: creating right to licence
- Assignment of copyright rights
- Infringement protection to licence
- The licence agreement
- Software and multimedia licensing

TECHNOLOGY TRANSFER OPERATIONS
AGREEMENTS

Trademark agreements

- Franchise and trademark licences
- Long life of trademarks
- Quality/service implications of trademark
- Registration and validity issues
- Control over licensee product quality
- Franchise—manifold property rights
- Types of franchise agreement

TECHNOLOGY TRANSFER OPERATIONS
AGREEMENTS

Development and collaboration agreements

- Joint research
- Joint developments
- Equity participation
- Joint ventures

Development and collaborative agreements

- Generally include an intellectual property rights agreement
- Clearly define divorce or ending clauses
- Created intellectual property rights

(Refer to other modules of the course)

TECHNOLOGY TRANSFER OPERATIONS
AGREEMENTS

Implementation service agreements

- Technical service and assistance
- Engineering services
- Management services
- Supply and off-take agreements

TECHNOLOGY TRANSFER OPERATIONS
AGREEMENTS

Services agreements

- Supply of equipment and materials
- Consultancy agreements
- Procurement and construction agreements
- Technical service—show-how agreements
- Engineering agreements
- Management and training agreements

TECHNOLOGY TRANSFER OPERATIONS
AGREEMENTS

Contractual framework of services agreements

- Agreement only at transferee initiative
- No property rights; no international conventions
- Content is furnished in detail
- Duration of services as agreed
- Warranty—diligent effort of contractor
- Performance warranties specifically sought
- Payments are for skills and effort only

TECHNOLOGY TRANSFER OPERATIONS
AGREEMENTS

Implementation agreements

- May involve more than one "property"
- May involve supplies and services
- May involve combinations of the above
- Hybrid agreements:
  - In advanced countries
  - In developing countries

TECHNOLOGY TRANSFER OPERATIONS
AGREEMENTS

General structure

- Parties to and intent of the contract
- Rights and capacities of technology owner
- Grant of rights and duration
- Obligations of the transferor
- Obligations of the transferee
- General conditions of the contract
- Dispute settlement and governing law

TECHNOLOGY TRANSFER OPERATIONS
AGREEMENTS

Contract structure

- Who, what, why, when and how much?
- Definitions
- Major rights, major limitations
- Technology transfer considerations
- Rewards for the licensor (payments)
- Reporting and audits
- Confidentiality
- Government restrictions
- Disputes
- Warranties and disclaimers
- Termination, residual rights and assignability
- Special features
- Notices

TECHNOLOGY TRANSFER OPERATIONS
AGREEMENTS

Obligations of the licensor

- Obligations arise from intents and rights
- Issues of ownership, infringement, liability, maintenance, defence and costs
- Issues of timeliness, diligence, sufficiency, completeness and warranties of performance agreements
- Liquidated damages for inadequate services or performance
- Special obligations

TECHNOLOGY TRANSFER OPERATIONS
AGREEMENTS

Obligations of the licensee

- Maintenance of image and quality of technology
- Timely payments
- Observing prohibitions
- Allowing inspection of the plant
- Auditing
- Executing special provisions: grant-backs, change of ownership and so on

TECHNOLOGY TRANSFER OPERATIONS
AGREEMENTS

Preliminary clauses

- Parties involved
- Purpose—vision
- Effective date
- Background of agreement for both parties (recitals)
- Place of agreement and authority signatures (usually at the end)

TECHNOLOGY TRANSFER OPERATIONS
AGREEMENTS

Preliminary clauses—definitions

- Patents
- Know-how
- Improvements
- Product/services
- Net sales or other
- Field and geography

TECHNOLOGY TRANSFER OPERATIONS
AGREEMENTS

Scope—grants

- Grants given and accepted
- Limitations and restrictions
  - Field
  - Geography
  - Time and duration
  - Volumes
  - Terminal rights

Scope—exclusivity

- Types
  - Exclusive
  - Sole licence
  - Non-exclusive

TECHNOLOGY TRANSFER OPERATIONS
AGREEMENTS

Considerations

- Terms
  - Running royalties
  - Sliding
  - Capped
  - Minimums
  - Down payments/milestones/instalments/ options (creditable or not)
  - Basis of computation
  - Penalties for late or insufficient payment
  - Duration

TECHNOLOGY TRANSFER OPERATIONS
AGREEMENTS

General terms

- Duration:
  - Limited
  - Life of patent
  - Multiple countries
  - Know-how
  - Restrictions by the European Union
- Rights to enforce/prosecute
- Patent maintenance and defence:
  - Who decides?
  - Who pays?
  - Who benefits?

TECHNOLOGY TRANSFER OPERATIONS
AGREEMENTS

Secrecy

- Duration
- Consequences
- Use of know-how by licensee
- Third parties

Improvements

- Grant-back
- Grant-forward
- Cost/reward
- Limitations by governments

Technical assistance

- Scope
- Cost
- Duration

TECHNOLOGY TRANSFER OPERATIONS
AGREEMENTS

Dispute resolution

- Mediation
- Arbitration
- Limitations
- Rules of the World Intellectual Property Organization

TECHNOLOGY TRANSFER OPERATIONS
AGREEMENTS

Selective bibliography

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TECHNOLOGY TRANSFER OPERATIONS
AGREEMENTS

Outline: warranties

- Obtaining assurance—risk element in technology transfer
- What is to be protected?
- Concerns in various forms of technology transfer
- "Warranties" and "guarantees"—basics
- Liabilities and remedies
- Contractual expression

TECHNOLOGY TRANSFER OPERATIONS
AGREEMENTS

Protecting performance

- Caveat emptor—"buyer beware" feature of commercial transactions
- Obtaining assurance of utility
- Risks in products, machinery, services and know-how
- Form of assurance—utility/viability
- What happens if the assurance is not met?

TECHNOLOGY TRANSFER OPERATIONS
AGREEMENTS

Risks in "technology products"

- "Warranties" and "guarantees"
- Risk exposure compared:
  - Goods
  - Services
  - Turnkey project
  - Technology forms—know-how and so on
- Joint ventures as risk minimizers

TECHNOLOGY TRANSFER OPERATIONS
AGREEMENTS

Risk and remedy in patents and trademarks

- Invalidity
- Third-party claims of infringement
- Licensee infringing on third-party rights
- "Hold harmless"/indemnification
- Joint defence, cost sharing provisions
- Remedies—no royalties; arbitration; counter-guarantees

TECHNOLOGY TRANSFER OPERATIONS
AGREEMENTS

Risk and remedy in know-how contracts

- Invalidity, third-party infringement and so on
- Procedure failures—non-delivery or late delivery, insufficient detail and so on
- Defective results
- Remedies: tied payments; payment counter-guarantees; liquidated damages; reduced royalties
- Bank guarantees, arbitration

TECHNOLOGY TRANSFER OPERATIONS
AGREEMENTS

Other risk concerns in technology transfer

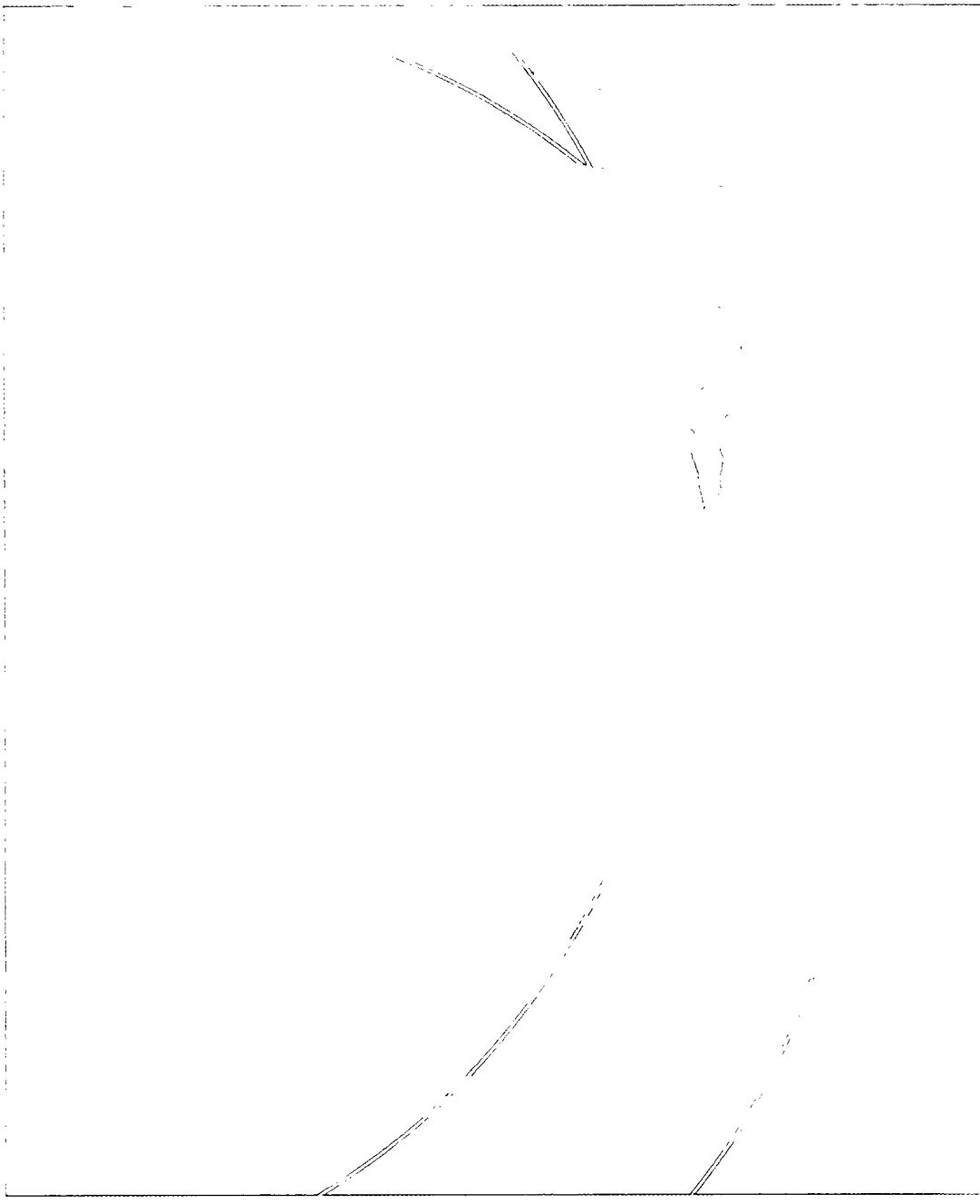
- Force majeure risks—war, riots and so on
- Consequential damages
- Contingent liability
- Damages to third persons
  - Consumers
  - Public
- Environmental and worker safety

TECHNOLOGY TRANSFER OPERATIONS
AGREEMENTS

General provisions

- Assignment
- Severability
- Force majeure
- Notices
- Reporting
- Audits
- Governing laws

VI. IMPLEMENTATION AND FOLLOW-UP



VI. IMPLEMENTATION AND FOLLOW-UP

A. Technology transfer mechanisms

Concepts

- Technology implementation is a **PROJECT** with a beginning and an end
- Effective, cross-functional **CORE TEAMS** are needed to direct and empower teams
- Action-oriented **PHASE REVIEWS** are needed to direct and empower teams
- A concisely documented **STRUCTURED DEVELOPMENT PROCESS** is needed to provide teams with a common road map
- Integrated sets of **DEVELOPMENT TOOLS** and **TECHNIQUES** improve the speed of implementation and the efficiency of the project

Technology implementation is a project with a beginning and an end. Effective cross-functional core teams are needed to direct and empower teams. Action-oriented phase reviews are needed to direct and empower teams as well as a concisely documented structured development process to provide teams with a common road map. The use of an integrated set of development tools and techniques improves project speed and efficiency.

Technology transfer starts with the transfer of technology from external and internal sources to those responsible for the research and development (R & D) project. This is true even if the technology is developed entirely outside the company. Next, there should be interaction between the R&D staff and those who will ultimately use the technology once it is ready. The technology transfer is two-way. The researchers communicate what they are learning as they proceed with the development activities to the users and the users inform the developers about the application and how the development will or will not be useful to the users. The better the two-way communication is, the more likely the resulting technology will meet the needs of the application. Finally, the completed technology is transferred in a physical sense to the application. It is implemented or installed into the application. However, technology transfer at this stage is more than physical. The installers and the users must be taught about the technology and how to use and maintain it properly.

Methods of technology acquisition fall into two categories: implementing technology development projects and implementing developed technology.

The fundamental difference between developing and developed technology projects is that they are two different steps on the road to the use of technology. Both are necessary, but in the case of developed technology implementation, someone else has completed the creation process. It needs only to undergo an implementation process to make it useful to the company. Developing technology projects must complete both the technology creation process and the step of being inserted into the company in a fashion, which makes the technology useful. This fundamental difference results in other characteristic differences. Developing technology projects are done by R&D workers, while development technology projects are implemented by operational staff. Finally, developing technology projects, regardless of how well they are planned, have a degree of uncertainty about them, while developed technology projects are more straightforward.

Technology development projects are characterized by uncertainty. The developers begin with a collection of known information and a goal or conceptual description of the final output. The gap between what is known and the final output is unknown. Although the primary purpose of a technology development project is to create the output, the project itself consists of a set of activities that are designed to convert the unknowns into knowns. The project must be structured in such a way that uncertainty is driven out and those responsible for the project can make informed decisions. An effective structure is the stage-gate process.

The project is divided into the following seven stages with "Go"/"No go" decision gates between each stage:

- Idea
- Preliminary assessment
- Concept
- Development
- Testing
- Trial
- Launch

Each stage is designed to reduce uncertainty to a new level and to provide the company's decision makers with the information they need to decide if the project should continue to the next stage or be scrapped.

The stage-gate process forces the company to continually consider and evaluate the technology being developed from technical and market perspectives. The flow chart shown at the end of this section illustrates this. The centre column of boxes contains the project's stages. To the right are the technical activities that need to be carried out. To the left are the market-related activities that need to be completed. The project cannot proceed to the next stage unless the technical and market activities have been completed and the results are encouraging enough that the company management can justify the further investment that the next stage will require. If proceedings to the next step are not justifiable, then the project is terminated. This forces the company's limited resources to be spent on projects in which the unknowns are converted into knowns and the newly found knowns provide evidence that the project will be successful.

The stage-gate process as described above is focused towards technology development projects that result in a product that the company makes and sells. In those cases where the technology development project results in a process improvement that makes it possible for the company to make its current product better, the stage-gate process is very similar. One difference is that the market includes those responsible for the products made with the present technology. They must be able to see that new technology will have the improvements expected without introducing unexpected problems. Another difference is that once the project reaches the launch stage, it is placed into a new project, a developed technology implementation project.

Implementing developed technology has a lot in common with implementing developing technology projects. The most important similarity is that each implementation is a distinct project with a beginning and an end. The project needs a plan with a schedule and clear "Go"/"No go" decision points, a project team and well defined responsibilities. The stage-gate process, with some modifications, is well suited to implementing developed technology projects.

The areas of difference have more to do with people and circumstances than with the process itself. Developed technology implementation projects have less technical uncertainty but more people uncertainty. People uncertainty arises in part because the project is to be done by operational people rather than development people. Operational people have less experience and feel less comfortable with uncertainty. They are more likely to feel threatened by the new technology. Much more emphasis must be placed on training and communication of the benefits of the technological improvement.

The first key to successful implementation of a developed technology project is to realize that the implementation is a process with a beginning and an end. With such an understanding, a team of affected persons can develop a project plan by using the following checklist:

- Describe goals/objectives
- Identify participants, roles and impacts
- Design methods to deal with the impacts
- Identify the resources needed and available
- Determine the completion date desired
- Constraints
- Break the project into steps

- Identify milestones and decision points
- Design project paths
- Design tracking methods
- Identify the persons responsible
- Design project communication methods

Documenting the project plan by developing and writing down the details associated with each of the items in the checklist addresses the first major cause of implementation failure, poor communication.

A number of tools exist to help project planners design and successfully conduct implementation projects. A few relevant ones are the following:

- Flow chart
- Project milestone status reports
- Gantt charts
- Complex network diagrams
- S-curves (schedule and costs)
- Work breakdown structures
- Project team meetings
- Communication to the rest of the organization

A flow chart illustrates the flow of work from the beginning of the project until its completion. It consists of boxes containing words that describe each step or set of activities connected by arrows, which indicate the order of the work. It illustrates decision points by showing steps where, if certain conditions are not met, the project either stops or returns to an earlier step. It shows when some activities can be done in parallel and when they have to be done chronologically.

The project milestone status report puts a start and end date on each step. The milestone status report also records actual completion dates that provide feedback to the project planners and the performers as well as management with regard to how well the project is meeting the schedule.

A Gantt chart illustrates in graphic form information in the milestone status report. It consists of the list of project steps on the vertical axis and time on the horizontal axis and shows the planned and actual beginning and end point for each step. Some Gantt charts also contain a column that indicates how each step compares with the others in terms of the amount of effort required, often called "weight", which is expressed as a percentage of the total budget or person-hours required.

A Gantt chart can be enhanced by adding an S-curve. The S-curve illustrates the planned expenses throughout the project in percentage terms from the beginning (0 per cent) to the end (100 per cent). Plotting the actual start and end and the actual expenses (S-curve) on the Gantt chart provides management and the project team with a very quick understanding of how the project is doing in relation to the plan in terms of completion of steps and expenditure.

An essential tool for a successfully developed technology implementation project is a project team meeting. The project team should be a multidisciplinary group that together has the set of skills and knowledge needed to properly introduce the new technology. It should include those involved in the technology's creation (from in-house R&D or from the technology supplier), those responsible for the physical construction activities (internal maintenance personnel and external contractors), those who will be responsible for using the technology after it is installed (production workers and management) and a representative from the company management. The primary purpose of the meeting is to ensure that all are kept abreast of happenings on the project. Project management tools such as milestone status reports, Gantt charts, S-curves, complex network diagrams and work breakdown structures are updated and presented at the meeting. Problems encountered are discussed and decisions taken.

Communication to the rest of the organization is also critical. A major hurdle to be overcome in any new technology introduction is the need for acceptance of and overall enthusiasm for the new technology. This has to start long before physical work begins. The new technology should not be a surprise to anyone in the company. People must see how the new technology will help the company.

B. Documentation principles

Documentation principles

Document

- Events
- Plans
- Ideas
- Results

Consistently, accurately, precisely and immediately

Throughout the technology transfer process it is necessary to implement a thorough documentation process. Such a process starts at the initial planning phase and concludes *after* the termination of the project. Events, plans, ideas and results should be included in the documentation.

Maintenance of the documentation needs to be done consistently, accurately, precisely and immediately. It is preferable to keep all documentation centrally (or at least a reference of where the documents are). Key individuals need to be appointed to take that responsibility. If possible, the same individual should follow the project from beginning to end.

Special care should be taken to document all exchanges relating to agreements between the parties. In particular, the custodian should receive copies of all meeting notes that include exchange of potentially proprietary information. That includes who participates, a summary of references to verbal communications, all documents exchanged or signed between the parties, including references to operational manuals, engineering drawings, patent disclosures and so on. The custodian should archive the documents in a safe and secure place.

In addition, the custodian will carefully monitor compliance with all secrecy obligations. In particular, interested parties will be advised when exchange of confidential information should cease (for agreements with a limited technology exchange provision). It will also be the custodian's responsibility to follow up on any other specific contractual obligations and to advise the appropriate personnel and management.

C. Audits and follow-up

Audit provisions are an integral part of most technology transfer agreements. They are a strong incentive for both parties to comply and can be imposed on either party depending on the contractual obligations. Audits should not be construed as an act of distrust of either party. Often non-compliance with specific agreement provisions is unintentional, in particular after personnel or management changes.

Audit

- Integral part of the agreement
- Two-way street
- Incentive to comply
- Follow-up

Audits

- Usually positive results
- Neutral parties
- Cost issues

Follow-up

- Agreement or technology transfer is just a beginning
- Most problems start small
- Leads to further possibilities
- Not done well

Experience has shown that audits yield positive results, which may be in the form of collection of royalty dues or in streamlining reporting procedures between the parties.

Typically, audits are performed by neutral third parties. The costs associated with such audits are usually borne by the requesting party. In certain agreements, costs will be transferred to the audited party if the discrepancies uncovered are above a pre-specified threshold (usually a percentage of royalties due).

Technology transfer agreements can lead to a long-term relationship between parties. They may constitute the beginning of additional transactions. In order to maintain and nurture the good will generated

by such agreements, it is important to maintain contact between negotiating entities. Owing to other priorities, that aspect of the technology transfer process is not carried out consistently.

Periodic contacts between parties allow potential problems to be uncovered at an early stage. Most problems start small and will be easier to resolve if tackled at their onset.

TECHNOLOGY TRANSFER OPERATIONS
IMPLEMENTATION AND FOLLOW-UP

- **Technology transfer mechanisms**
- **Documentation principles**
- **Audits**
- **Follow-up**

TECHNOLOGY TRANSFER OPERATIONS
IMPLEMENTATION AND FOLLOW-UP

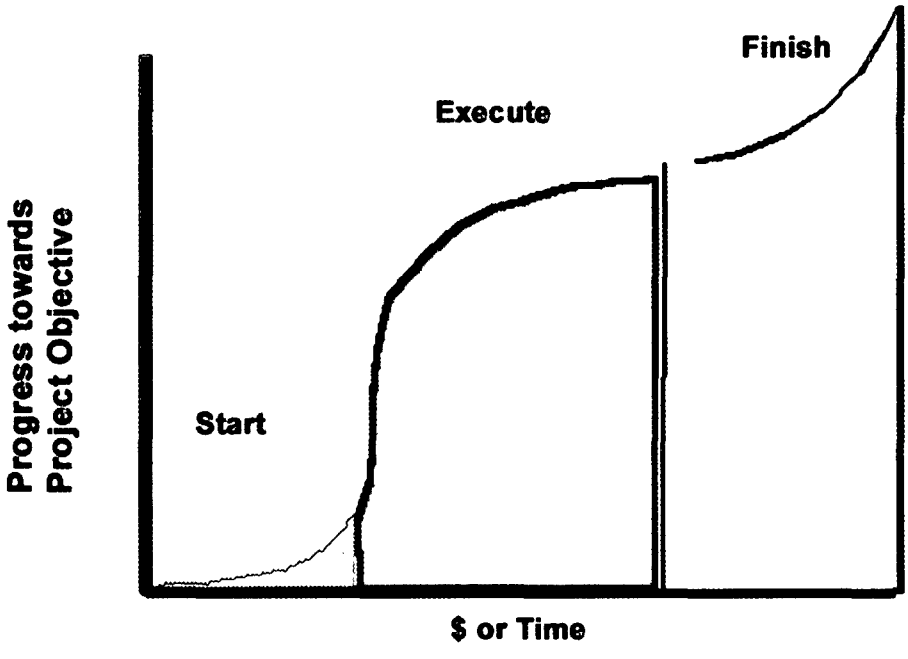
Concepts

- Technology implementation is a **PROJECT** with a beginning and an end
- Effective, cross-functional **CORE TEAMS** are needed to direct and empower teams
- Action-oriented **PHASE REVIEWS** are needed to direct and empower teams
- A concisely documented **STRUCTURED DEVELOPMENT PROCESS** is needed to provide teams with a common road map
- Integrated sets of **DEVELOPMENT TOOLS** and **TECHNIQUES** improve the speed of implementation and the efficiency of the project

TECHNOLOGY TRANSFER OPERATIONS
IMPLEMENTATION AND FOLLOW-UP

Three phases of technology transfer

- Transfer of technology to the research and development project from other sources
- Transfer of technology to and from the research and development project during progress
- Transfer of technology from the research and development project to commercializing unit for application



TECHNOLOGY TRANSFER OPERATIONS
IMPLEMENTATION AND FOLLOW-UP

Technology implementation projects

1. Technology development
   - Managing internal activities (research and development)
   - Managing external technology acquisition
2. Installing developed technology
   - Implementing a new product
   - Implementing a new process

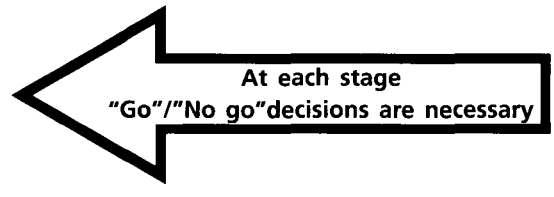
TECHNOLOGY TRANSFER OPERATIONS
IMPLEMENTATION AND FOLLOW-UP

Implementing technology development projects

Use a seven-stage process:

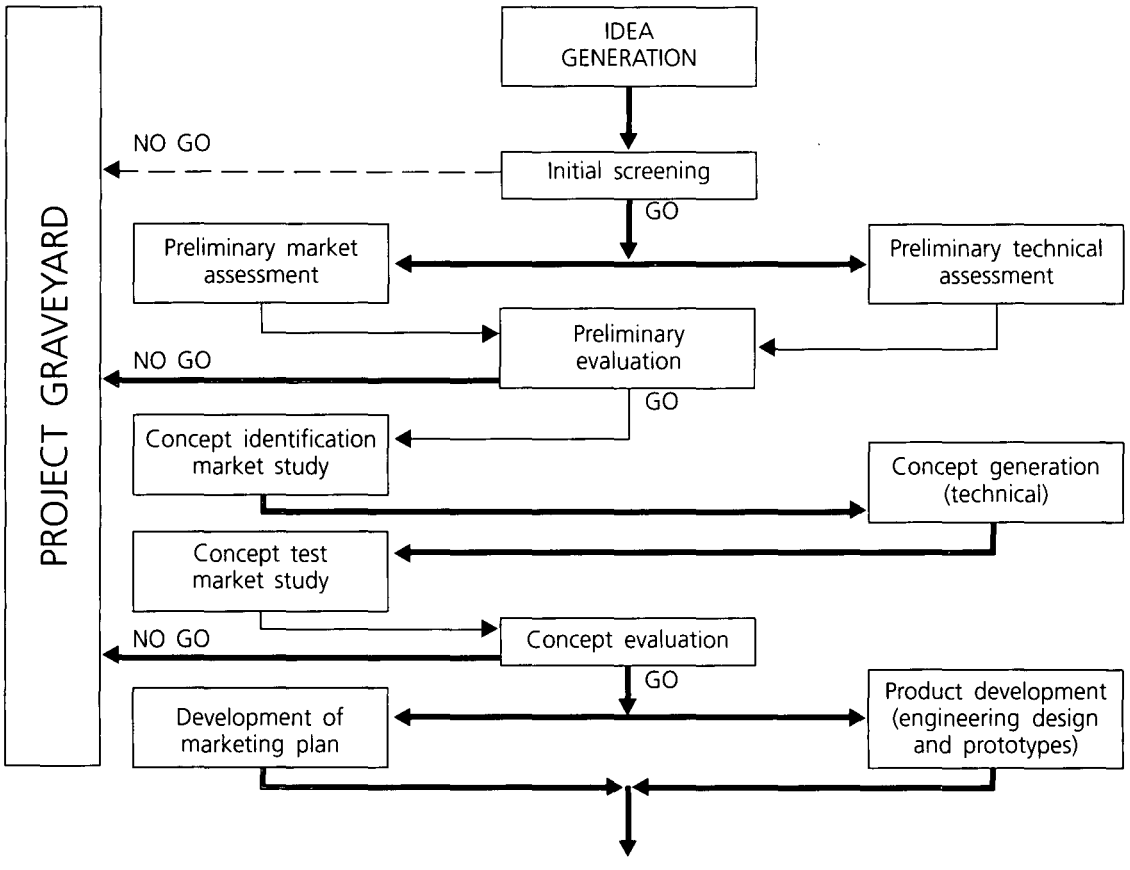
1. To drive out uncertainty
2. To have informed decision-making

Idea
Preliminary assessment
Concept
Development
Testing
Trial
Launch



TECHNOLOGY TRANSFER OPERATIONS
IMPLEMENTATION AND FOLLOW-UP

Stage-gate process



TECHNOLOGY TRANSFER OPERATIONS
IMPLEMENTATION AND FOLLOW-UP

Managing technology/product development

- Internal activities (research and development)
- External technology sources

Use stage-gate process for all types

- Follow-up
- All decisions must be made
- Difference is timing and who does what

TECHNOLOGY TRANSFER OPERATIONS
IMPLEMENTATION AND FOLLOW-UP

Implementing developed process technology

- Internal activities (research and development)
  - Different type of people
  - Much less technical uncertainty
  - Much more people uncertainty
  - Have to deal with continuing normal business
- Need a stage-gate process similar to technology development
  - Distinct project with beginning and end
  - "Go"/"No go" decisions
  - Schedule
  - Responsibilities

TECHNOLOGY TRANSFER OPERATIONS
IMPLEMENTATION AND FOLLOW-UP

Design project

- Internal activities (research and development)
- Identify participants, roles and impacts
- Design methods to deal with impacts
- Identify resources needed and available
- Determine the completion date desired
- Constraints
- Break the project into steps
- Identify milestones and decision points
- Design project paths
- Design tracking methods
- Identify the persons responsible
- Design project communication methods

TECHNOLOGY TRANSFER OPERATIONS
IMPLEMENTATION AND FOLLOW-UP

Tools for developed technology implementation

- Flow charts
- Project milestone status reports
- Gantt charts
- Complex network diagrams
- S-curves (schedule and costs)
- Work breakdown structures
- Project team meetings
- Communication to the rest of the organization

TECHNOLOGY TRANSFER OPERATIONS
IMPLEMENTATION AND FOLLOW-UP

Flow chart

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TECHNOLOGY TRANSFER OPERATIONS
IMPLEMENTATION AND FOLLOW-UP

Area B: Project milestone status		Date: August 10	
Description of event	Scheduled deadline	Date completed	Delay (days)
Complete earthwork B	March 30	April 15	15
Complete main foundation concrete	April 15	April 30	15
Equipment B received on site	April 15	May 15	30
Complete equipment B foundations	May 30	May 30	0
Piping B installations, 20% complete	July 31	—	30
Install main transformers	August 15	—	—
Start area B preoperational tests	October 01	—	—
Complete electromechanical B	December 01	—	—
Complete tests—begin operation	December 30	—	—

TECHNOLOGY TRANSFER OPERATIONS
IMPLEMENTATION AND FOLLOW-UP

Gantt chart and S-curve—schedule

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TECHNOLOGY TRANSFER OPERATIONS
IMPLEMENTATION AND FOLLOW-UP

Project team meetings

- Key people

Review reports

- Project milestone status reports
- Gantt charts
- Complex network diagrams
- S-curves (schedule and costs)
- Work breakdown structures
- Modify plans to fit reality

TECHNOLOGY TRANSFER OPERATIONS
IMPLEMENTATION AND FOLLOW-UP

Develop and deliver communication plan to rest of organization

Key players

- Project team meeting

Management

- Status reports
- Meeting minutes summary

Those to be affected

- Announcement of progress
- Tours of site
- Discussions of problems

Others not affected

Highlights on bulletin boards

TECHNOLOGY TRANSFER OPERATIONS
IMPLEMENTATION AND FOLLOW-UP

Documentation principles

Document

- Events
- Plans
- Ideas
- Results

Consistently, accurately, precisely and immediately

TECHNOLOGY TRANSFER OPERATIONS
IMPLEMENTATION AND FOLLOW-UP

Documentation

- Kept centrally
- Responsibility of key individuals
- Accountability
- Succession

Agreements documentation

- Custodian to maintain
  - Meeting notes
  - Documents exchanged
  - Archive of documentation
- Monitor compliance to secrecy obligations
- Follow-up on obligations

TECHNOLOGY TRANSFER OPERATIONS
IMPLEMENTATION AND FOLLOW-UP

Audit

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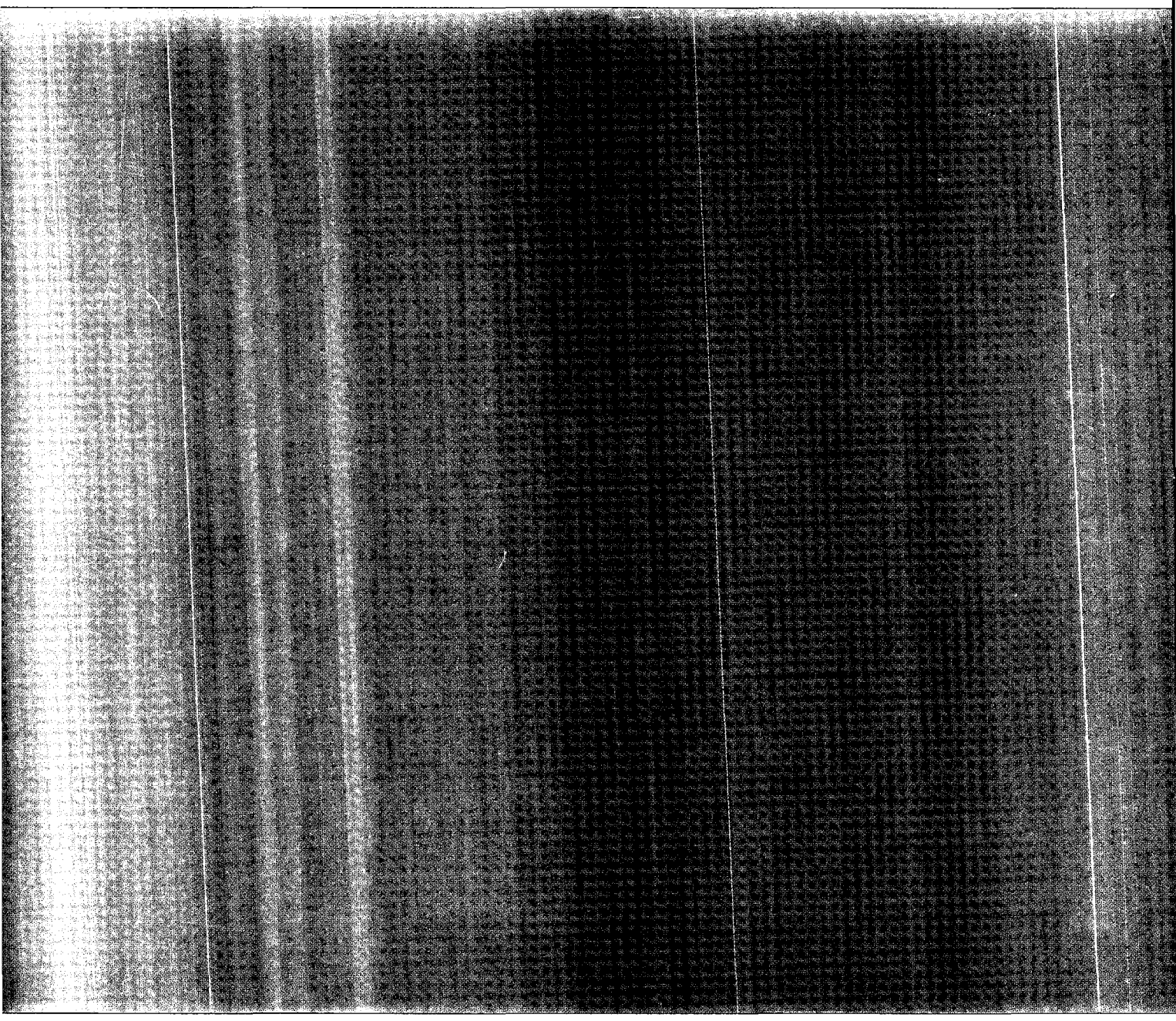
Printed in Austria
V.03-90774—October 2004—500



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