Chapter 4 – Technology Acquisition

Course Contents: TM Activity – Acquisition: Introduction, Definition, Internal acquisition, R&D processes, External technology acquisition, External acquisition processes, Case study. [TB 1: Ch. 4]

Contents

Introduction

Nowadays, technology has become a strategic element in every organization since its management is the key to creating and consolidating competitive advantages in a market or a sector. Bringing in new technologies can provide the company with the opportunity both to develop new products and to enter new markets. The technology acquisition process is an essential source of ideas for creativity and the gradual incorporation of technological innovation opportunities in an organization. Specialist technical expertise and capabilities are often difficult to obtain and a firm may not have the ability. As a result, it involves bringing in new technologies from external sources rather than using the firm's own internal research and development activities.

Technology can be acquired in a number of ways like internal research and development, joint ventures, organizational change, project management, licensing, corporate mergers and acquisitions, technology transfer, technology insertion, subcontracting, alliances, joint R&D and industry-university collaboration. By its nature, technology acquisition is a technology transfer, with transaction costs associated with the various stages of the acquisition process. Understanding the various options available and deciding which might be best in particular circumstances can be challenging. This is further complicated by the number of possible routes technology acquisitions can take. In all cases there is a need to devote substantial resources to assimilate, adapt and improve upon the original technology and to put suitable strategies in place to protect it. All of these factors make the technology acquisition a complex process. This chapter will discuss the complexities associated with technology acquisition process.

Technology Acquisitions

In its most simple form, technology acquisition requires:

- Identification of attractive technologies or partners with technological capabilities;
- Assessment of these opportunities, selection of the most promising ones and consideration of the terms of the acquisition;
- Negotiation of the terms of acquisition between acquirers and sellers;
- Transfer of the technology to the acquirer, if these negotiations have been successful.

The assessment and negotiation stages form a cycle as it is expected that the terms discussed during negotiations will need to be re-assessed before acceptance. The focus of this section is the second stage of this process, involving the assessment of the technologies and the organizations that own them and the evaluation of all the acquisition opportunities.

Acquisition Context

Before making any decisions in relation to a proposed technology acquisition it is essential to consider the context in which it is taking place and to identify the key issues involved. A structured approach will help to reduce the complexity of all the possible scenarios and ensure that those involved remain objective and focused on the most important questions.

1. Why do we want to acquire the technology?
2. Who are we going to acquire the technology from?
3. How mature is the technology and how might this affect our acquisition options?

We will also look at some approaches that companies have used to help narrow down the sometimes bewildering number of options and identify the most appropriate acquisition strategy for their firm.

Why do we want to acquire the technology?

An organization's motive for wanting to acquire a technology will affect the kind of technology they are looking for, the partners from whom they decide to acquire it and the process they follow to make the acquisition. Previous research indicates four kind of motivations:

M1: Developing new technological capabilities
M2: Increasing strategic options
M3: Gaining efficiency improvements
M4: Responding to the competitive environment.

Here is a checklist that can help you to discuss the issues and identify your company's motives.

Checklist 1: identifying your firm's motives for technology acquisition

Develop technological capabilities		Is acquisition sought to: • fill gaps in firm's own R&D base or capabilities? • fill holes in an existing product line? • create and establish a new product for the firm? • overcome technology exhaustion?

Increase strategic options		Is acquisition seen as: • an opportunity to increase capabilities in light of changes in the firm's environment? • away of overcoming internal technological constraints in order to enhance strategic flexibility? • a means to access the best available technology in the future?
Gain efficiency improvements		Is the acquisition seen as a means to: • reduce development time? • reduce costs? • increase customer interest (particularly in periods of rapidly changing demand)?
Respond to the competitive environment		Is acquisition important because: • technology markets are emerging? • environments are more hostile? • there is rapid technological change? • there are fast-moving competitors in the market area?

Action point

Use the checklist above to help you identify your firm's motivations for acquisition. Involve as many people as possible in the discussions. The checklist can be adapted to suit your particular circumstances. The 'weight' column can be used to reach a consensus and prioritize the specific acquisitions objectives. This quantitative approach can be very useful in helping to make the issues more objective and eliminate personal bias. A suggested approach is to use a 0 (not important) to 10 (very important) scale, assigning a value to each of the possible motivation areas. It is important to be really clear about the motivations of an acquisition before making any assessment of specific acquisition opportunities. The results of this exercise will help to inform the evaluations, when possible alternatives are considered. Undertaking this exercise should prevent individuals' personal views taking priority over the 'big picture'.

M1: Developing new technological capabilities

One of the fundamental motivations for the acquisition of external technologies is the need to develop new technological capabilities and to fill gaps in the R&D knowledge base. The objective of these acquisitions is sometimes to fill holes in an existing product line, while in other cases it is to create and establish a brand new product. This need may arise because specialist technical expertise and capabilities are often difficult to obtain and firms may not have the ability to develop these valuable knowledge-based resources internally. This may be the case,

for instance, when the technological knowledge of a firm is close to exhaustion and most of the possible technological combinations have already been tried.

M2: Increasing strategic options

Acquisitions can enable a firm to improve its strategic flexibility. Increasing its internal technological capabilities, can give the company more strategic options, allowing it to select the best available technology. For example:

- Acquisitions can encourage innovation, countering inertia and rigidity and increasing R&D productivity. Relying on incremental improvements to existing technologies may limit a firm's potential. Experimenting with novel and emerging technologies can provide opportunities for more radical innovation.

- Acquisitions can open new markets, allowing the knowledge of new customers, channels, inputs, processes and markets to be exploited.

- Acquisitions may help to deal with uncertainty and risk. Companies operating in high-tech industries are often dependent on uncertain future outcomes or developments. In such cases, managers are more likely to avoid risky internal investments in R&D with long-term payback periods, investing instead in external technologies as a way of keeping their options open until the risks and uncertainty diminish.

M3: Gaining efficiency improvements

The need to innovate more rapidly is another motivation for technology acquisition as it can reduce the time to market. The internal development of new capabilities may take too long or be too costly. Technology acquisition can create these more quickly so that the firm can be more responsive to market demands.

There are often cost advantages to acquiring technologies externally. Firms substitute fixed investment costs with variable acquisition costs and such costs can be recovered via profits from new businesses that follow a partnership-based strategy.

M4: Responding to the competitive environments

Firms are more likely to consider technology acquisitions as environments become more hostile, when there is rapid technological change and fast-moving competition in their market area. Acquiring technologies helps the firm to feel less vulnerable and more competitive. In such an environment it is likely there will be a greater use of partnerships, collaborations and outsourcing as a substitute for in-house activities.

Who are we going to acquire the technology from?

Technology can be acquired from a number of different kinds of sources including private companies, universities and government agencies. It may be acquired from a single

organization, or more than one can be involved, sometimes in the form of a consortium. It is very important to understand the characteristics of your potential partner(s) as these will determine their expectations and behaviour during collaborations. Examples of the different perspectives and characteristics of some of the organizations that may be involved are discussed below.

- **Universities:** Universities are increasingly interested in the commercialization of research but are generally inexperienced in commercializing IP. Regulations regarding ownership of academic research outputs vary from country to country. Furthermore, an element of tension exists between academics who wish to publish results and industry which prioritizes the filing of patents. An additional issue is that high turnover of people in academia might lead to information leaks.

- **Start-up companies:** Start-ups can be an important source of ideas for larger companies. However, they are typically lacking in resources and business knowledge and are often subject to the influence of their investors (e.g. Venture Capitalists). They may be more flexible but also more 'volatile' than established firms. They may own only one technology and the fear of losing control over it might lead to over protective attitudes. Partnerships between start-ups and established firms can be mutually beneficial. Research shows that making such partnerships work may be problematic, but there are ways to increase the chances of success.

- **Consortia:** Consortia are becoming more common. A firm gets together with other types of organizations (any mix of universities, industry and government bodies) typically to tackle complex technological issues which would be difficult to deal with in isolation. Consortia are more common in industries with long technology life cycles such as pharmaceuticals. This industry requires access to a wider set of competences beyond the traditional areas of chemistry and pharmacology - such as molecular biological, nanotechnology and computational science - to guarantee future innovation.

How mature is the technology and how might this affect our acquisition options?

The technology you plan to acquire will typically require further development. Its level of 'maturity' may range from something that is simply a new scientific phenomenon right through to a technology that is almost market-ready. The maturity level – and the amount of work needed to bring it up to the level your firm requires – are obviously highly significant factors to consider in the context of any acquisition. There are various ways of measuring the maturity of a technology and we discuss these below. It is important to be aware, however, that how you assess technology maturity levels depends on your particular situation and is affected by your company's motivations for the acquisition.

Measuring technology maturity levels

One approach to measuring technology maturity levels are the reference scales used by NASA. These are frequently used in the context of aerospace innovation. An alternative metric is provided by the STAM (Science, Technology, Application, Market) model.

The STAM model of technology development phases

S = Science: Development of understanding of scientific phenomena (and/or underpinning technology platform)

S/T = Science/Technology transition: Demonstrating the feasibility of a scientific phenomenon (and/or underpinning technology) to support a new market-directed technology platform, showing the feasibility of the supporting science and technology to be integrated into an application-specific functional technology system.

T= Technology Technology emergence. Improving the reliability and performance of the market-directed technology to a point where it can be demonstrated in a market-specific environment.

T/A = Technology/Application transition: Developing the technology and application to a point where commercial potential can be demonstrated through revenue generation.

A= Application Improving the price and performance of the application to a point where sustainable business potential can be demonstrated.

A/M = Application/Market transition: Translating price-performance demonstrators into a market with mass growth potential.

M= Market Marketing, commercial and business development leading to sustainable industrial growth.

According to this model a technology starts with its scientific underpinnings, then develops into a technology, leading to an application and finally to the market. The knowledge transfer mode will vary, depending on the technology's maturity level at the beginning of the collaboration and its desired final development stage.

Framework 1: technology sources and technology maturity levels

Current and expected	Potential sources for the technology						
		One to one					One to many
		University	Governmt	IndividualConsultant	comp	Large	Small compConsortium
	S Very low						
	T Low						
	A Medium						
	M High						

Action point

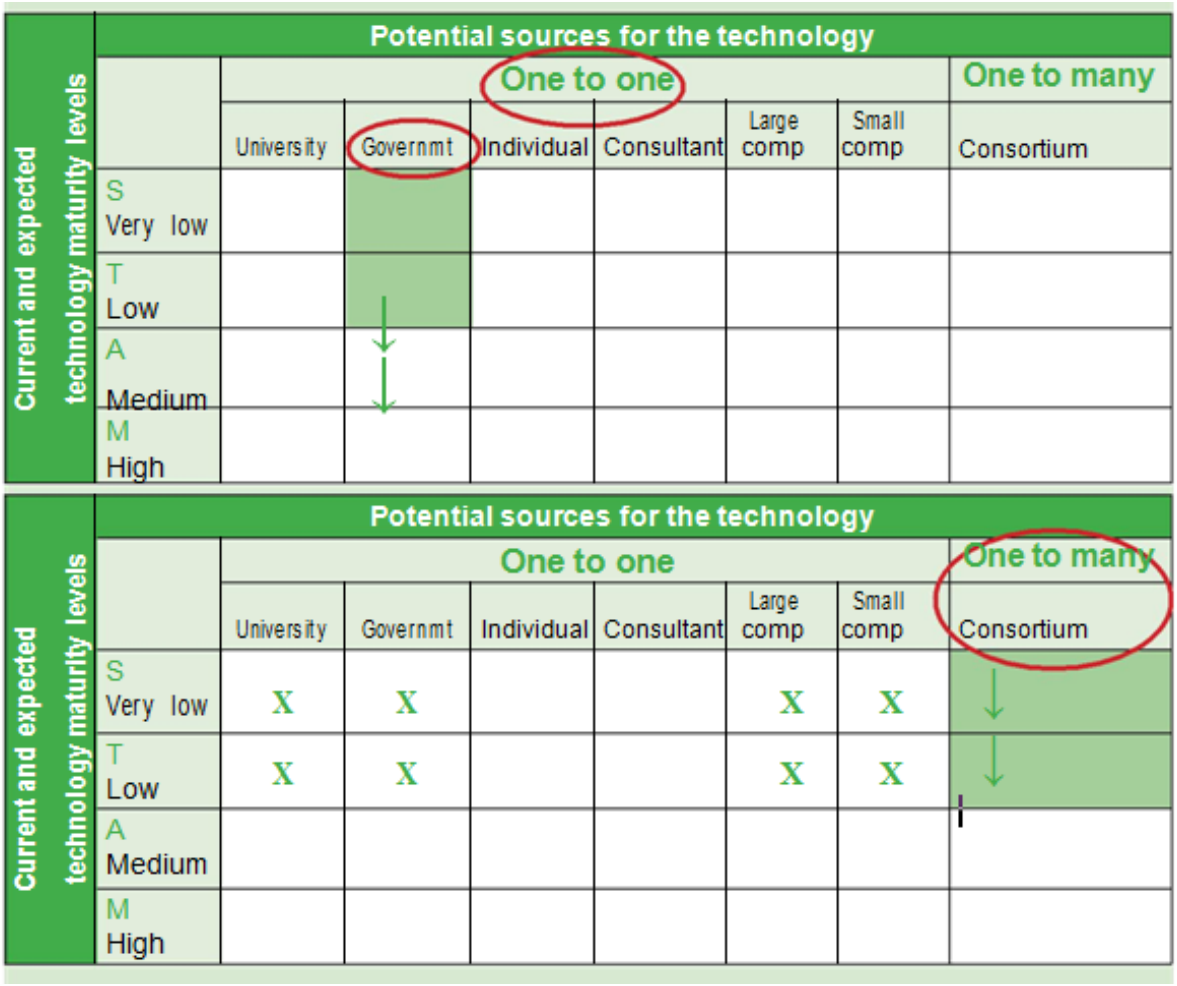
This framework is based on the STAM maturity system (see box opposite). Some combinations of technology maturity level and source may not apply to your situation but using this structured approach should help to clarify the implications of the options available.

Involve as many of your colleagues as possible in the discussions. Consider the anticipated strengths and weaknesses of each possible source. Discuss both the initial maturity of the technology and the desired maturity level, post acquisition.

Useful questions to ask

- What types of organizations could be considered as a source for the technology?
- What are their key characteristics?
- What are their motivations in selling/giving the technology to us?
- What alternative partnering options could we consider?
- What degree of maturity characterizes the technology currently?
- What degree of maturity will the technology have at the end of the acquisition?

Case Example



A firm in the aerospace sector is considering collaboration with a Government scientific organization. The key characteristic of this organization is that it is 'not-for-profit' and hence its objectives for the collaboration are very different to the firm's. For example, it aims to reinvest the payment it receives from the company in further research and in this way meet the expectations of the Government, a key stakeholder. Being clear about the expectations of its prospective partner helped the aerospace company to anticipate future problems. The framework above supported a discussion concerning the possible forms such a partnership could take in relation to the acquisition of very early stage technology. The discussion showed that there was an alternative to a one-to-one relationship between the aerospace firm and the not-for-profit organization. This involved a consortium of industrial and academic partners. Forming a consortium could require those involved to contribute to its cost. Alternatively, external funding could be found, for example through European grants. A grant might impose constraints on the partnership composition. For example, the consortium might need to include different kinds of members.

The framework enabled the company to explore the pros and cons of the different approaches. The figures above depict both options (one-to-one and a consortium). The arrows indicate the

desired increase in the technology's maturity level to be achieved as a result of the partnership. The Xs indicate the potential partnership composition of the consortium.

Narrowing down the options

Experienced managers have devised ways of narrowing down the sometimes bewildering number of options available in relation to technology acquisitions. They have found it is of fundamental importance to clarify the context of the acquisition, in order to constrain the number of options and reduce the complexity of all the possible acquisition scenarios to a manageable set. Developing an overall acquisition framework will help during the evaluation of the proposed acquisition. Below showing examples of how two companies have set about deciding the most appropriate acquisition strategies for their firms. Both approaches are particularly relevant for firms acquiring technologies to be exploited in their products or services.

Example A: Chemical company

Market in which technology will be employed	Technology readiness level		
	Research	Development	Commercialisation
Current market	Not very common – company's own internal research team more likely to achieve progress.	This is most common situation. May involve in-licensing, joint venture or merger and acquisition. Typical partners are SMEs and other firms.	Not common.
New market	For example partnership with a university. Technology could be co-developed under an umbrella agreement, or might involve partial equity investment which allows the company to be once removed from the risk.	Unlikely scenario.	Unlikely scenario.

An experienced R&D manager of a chemical firm suggested considering possible technology acquisition scenarios in terms of:

- **The readiness level of the technology:** At what point in the innovation process will the technology be acquired? This might be at the research stage, during the development stage, or close to commercialization.
- **The market in which the technology will be employed:** Will the technology be applied in an existing market or one which is new to the firm?

This simple framework helps support discussion of the various potential acquisition options.

Example B: Aerospace company

Readiness of the market	Readiness of the technology: Ready	Readiness of the technology: Not ready
Ready	This is a quite common scenario in which we need to de-risk the acquisition as much as possible, either financially or technologically. We typically stage the acquisition, and 'test' the technology by setting up a collaboration during which we mix our IP with that of the partners. At the end of this first co-development we might have three options. 1) We transfer the technology to our partner, retaining the right to use it. 2) We acquire the technology and agree the other partner's rights to use it. 3) We part company maintaining for a certain time the right to use what we developed together.	This is the 'buy' scenario. We may use different acquisition approaches such as buying up an entire firm, licensing in a technology or setting up a joint venture.
Not ready	This is the 'speculative' scenario, a very common one in our highly regulated industry. As the market is not yet ready, we are in the pre-competitive realm. We typically go for the consortia or 'clubs' in collaboration with other firms. We create a different institution (e.g. a firm, or to keep the costs down, we use government funds and bodies) setting up clear responsibilities and rights over future IP for all the participants. We look hard to anticipate potential future scenarios and embody them in the terms.	This is the 'game-changer' scenario. We would like to do this more and be able to acquire technologies which could change the way in which we do things. However this requires internal reconfiguration and hence these acquisitions are more difficult. We need to work hard on the absorptive capacity required.

A highly experienced IP manager of an aerospace firm suggested considering technology acquisitions in terms of:

- **The readiness of the market**
- **The readiness of the technology**

The table above shows the kind of issues the company needs to consider in each of the four scenarios that this approach produces.

Acquisition evaluation

Once you have identified a technology you want to acquire and a possible source from which to obtain it, you need to thoroughly assess whether the proposed acquisition is likely to meet your needs. This section will help you do this in a structured way in terms of three main factors:

- Your company's ability to absorb and use the technology
- Compatibility of you and your potential partner
- Suitability of the technology for your needs

The issues involved in relation to each of these factors are discussed below, followed by a series of quantitative checklists which can be used to assess a particular acquisition for your

own company.

Absorptive capacity: can you assimilate the technology?

Firms that possess a large stock of knowledge are more likely to acquire technologies externally because they themselves are more capable of identifying and absorbing new knowledge. This capability is termed 'absorptive capacity' and represents the ability of the firm to evaluate, appropriate and make good use of external knowledge. Firms with superior absorptive capacity are able to innovate and be profitable by being more effective at either selecting or deploying resources than their rivals. A firm's absorptive capacity will therefore relate to:

- Its level of technical knowledge concerning the technology to be acquired.
- Its level of experience in acquiring technology and its own R&D capabilities. Previous experience of technology acquisition and high technological knowledge may predispose firms to make acquisitions because they perceive themselves to be capable of selecting and absorbing targets.
- Its stock of intellectual property (IP) relating to the technology to be acquired. Depending on the competitive structure of the industry, different types of protection mechanisms can be used to protect and pave the way for future innovation and acquisitions and to block other innovators.
- Its willingness to accept new ideas and technologies from outside the organization. As successful organizations grow they tend to develop shared expectations about how things are to be done, leading to forms of cultural resistance to change. This cultural inertia is difficult to address directly and is exacerbated by the tendency of organizational departments to develop resistance to new technologies and ideas.

  The 'not-invented-here' (NIH) syndrome is a risk for acquisitions when external ideas and technologies are rejected by in-house engineers and managers.
- Its flexibility in adopting new routines. Organizations develop highly structured routines in order to reduce the costs associated with certain types of information acquisition and coordination. As a result, organizations tend to exploit existing knowledge and capabilities, avoiding more exploratory activities. It is hence important to understand that the acquired technology can challenge existing routines in a way that the organization might find difficult.
- Internal support. Achieving internal organizational buy-in is important when bringing new technologies into the firm as the mismanagement of the integration of the technology into the firm can often lead to failure. Support is necessary for the acquisition project in order to ensure the necessary internal resources to assimilate and exploit the technology.
- Sharing knowledge with external partners. Partners need to be ready and willing to share information and understanding with each other. This can be particularly challenging if the companies involved are significantly different in size and experience.
- Applying acquired technology in new products. The company needs to have enough understanding of the new technology to be able to apply it in their products.
- Exploitation of the technology. Technology acquisitions are likely to be most successful if

the acquiring firm is able to exploit the new technology in multiple ways.

A firm's absorptive capacity can be increased as a result of the education, training and/or experience of its employees. Firms may attempt to increase their absorptive capacity by sending employees on advanced technical training.

Partners: how compatible are those involved?

The next part of the process involves evaluating the level of compatibility between you and your potential partner and includes what is often referred to as 'due diligence'.

An important first step is to consider the relationship that may already exist between you. How well do you know your partner to be? Have you worked with them before? Trust is central to such transactions (see Developing good relationships page 33) and a good relationship can provide the basis for further, deeper partnerships in the future.

If there is concern about the motives of one of the partners in collaborative acquisitions, measures can be put in place to limit knowledge exchange between the collaborators.

For example, in certain types of alliances gatekeepers limit the number of personnel actively involved in alliance management, and control key operational tasks.

The level of strategic alignment between potential partners is another important contributor to their likely compatibility. This includes:

- A shared strategic vision on alliance aims. Do the partners understand each others motives and what they stand to gain from the transaction?
- Compatible alliance and corporate strategies. Will the alliance work in ways compatible with the needs of those involved?
- Shared view of the strategic importance of the alliance. Is the alliance equally important to the partners? Everyone involved should ideally be equally committed if the alliance is to succeed.
- Mutual dependence. Are the partners mutually dependent on each other for the alliance to succeed?
- Potential for the alliance to add value for clients or partners. Will the alliance meet the needs and expectations of other stakeholders?
- Market acceptance of the alliance. Will customers, competitors or government bodies see the partnership in a positive light?
- Technical capability. Does the potential partner have the necessary technical capability to make the partnership a success?

Other factors to consider that may affect partner compatibility include the working style and organizational structures of each organization. Mismatched organizational structures, excessive physical distance and incompatible communication technologies can all make interpersonal interactions difficult. For example, in partnerships between large firms and start-ups, the firms operate at a different pace. They will have different modes of decision-making and the personal

objectives of employees are likely to vary. Furthermore, organisations from different regions may exhibit significant cultural differences.

Finally, any prior experience of entering into alliances or technology transactions is another factor to take into account. If the technology owner or partner has

experience in the anticipated form of technology transfer, whether licensing, consortia, spin-outs or joint ventures, then the project is more likely to be successful.

The absence of these components suggests that the proposed technology acquisition is less likely to be successful. Firms should be particularly aware of these issues when entering into alliances or partnerships with competitors.

Technology: is it suitable?

Finally you need to decide whether the technology itself is suitable for your needs. First consider your objectives for acquiring the technology in the first place and make sure your proposed acquisition meets these objectives.

Other important factors to consider when assessing a technology's suitability include its potential commercial value. Establishing a valuation for an early stage technology can be problematic however. There will be a high degree of uncertainty in relation to both the technology and the market, together with uncertainties surrounding the transaction itself. For example, when undertaking a merger and acquisition (M&A) in order to acquire a new technology or technological capability, there is usually a high level of information asymmetry between the acquirer and the acquired firm. These skills and knowledge are difficult to value. Furthermore, managers may fall in love with some aspect of the technology and be overly optimistic about the value of their prospective partners, failing to recognize that there are really no gains in takeovers. A number of tools can support technology valuations including Portfolio Analysis, Real Options, Net Present Value, and Value Roadmapping among them.
IP is another issue to consider when acquiring early stage technology via collaborative development modes (e.g. alliances, consortia and joint ventures). Existing IP titles, particularly patents, are considered useful when acquiring the technology as they can be used as 'currency' or 'bargaining chips' to help avoid delays.

The ease with which any technical challenges can be overcome during future development of the technology is another factor to look at when assessing its suitability.
Overcoming such challenges will depend on gaining access to various kinds of knowledge:

- **Know-how:** the skills of employees and the ability to make use of these skills.
- **Know-what:** specific technical and market knowledge relating to the technology, including technical details, procedures, manuals.

- **Know-who:** the knowledge and understanding of technically expert contacts and organizations along the supply chain who can make the technology work.

The technology will consist of both the codified knowledge of its operation in documentation and the tacit knowledge that exists in the minds of those who developed it.

Acquiring this tacit knowledge without input from these individuals is often expensive and time consuming. Accordingly, the simultaneous acquisition or retention of these key personnel is a significant factor in the further development of the technology. It is important for the acquirer to recognize this tacit knowledge and the need to access the complex network of relationships that often make further technological development possible.

Technology, and the knowledge that underpins it, can be difficult and costly to transfer. Consideration needs to be given to both the implicit and explicit aspects of technology transfer. The cost of acquiring the technology goes beyond the payment made to the technology's owner.

There are also transaction costs associated with the types of issues described earlier. These include an estimate of future costs, costs associated with any uncertainties concerning the acquisition, the need to acquire specific assets and how often it may be necessary to repeat such transactions.

Acquisition options

This section will help you identify and evaluate the different options for regulating and managing the acquisition. We have divided these into seven areas:

- Future technology development
- Contracts and relationships
- Ownership of intellectual property (IP)
- Technology exploitation
- Rights to use a technology
- Exchange 'currency'
- IP protection

Evaluating these issues is intrinsically more speculative than the types of assessment made in the previous section. Frameworks and checklists are provided to help you consider all the issues involved, together with case study examples. We also identify the potential risks relating to the various options, so that these can be properly considered ahead of negotiations and protection strategies adopted if necessary.

Future technology development

In most technology transactions, the technology is still immature and needs to be enhanced and developed to fit the needs of the firm. Knowledge has to pass between one party and the other at

some point during this development. There are three main approaches to this: the technology can be developed internally by the acquiring company; it can be done externally by the technology provider; or it can be carried out collaboratively between the two. The choice of development path will depend on a number of things including the type of technology involved, the resources available, the degree of control the acquiring firm needs to maintain over the technology and the strategy driving the acquisition.

Internal development

When the technology to be acquired needs to fit very precisely with the company's products, a high degree of control over the development may be required and hence internal development may be preferred. This approach is particularly desirable where there are concerns over confidentiality.

External development

An alternative development path could be to give very detailed specifications to the external party so they can carry out the required enhancements to the technology. This is the preferred approach by firms who consider the cost of internal development is too high and prefer to obtain as mature a technology as possible.

Co-development

Other firms may prefer to co-develop a technology with an external partner or partners. This approach is likely to be preferred if they consider the partner suitable for strategic long term collaborations. In such cases, the knowledge will pass from one partner to another gradually, over a period of time. It could then be more formally transferred at the end of the relationship. This type of development requires the investment of a great deal of time and resources to manage the relationship effectively.

Contracts and relationships

Another dimension of acquisition to consider concerns the relationship between the parties involved. The form the relationship takes will vary according to the nature of the technology transfer. This may range from a simple contract for R&D services at one end of the scale, to a joint venture or even take-over by one company of another.

The formal relationship between the parties will be governed by some kind of contract designed to protect the parties during the transactions and act as a guarantee that the relationship will be profitable for both sides. Perhaps equally important is their informal relationship, which is based on the social norms and level of trust that exist between them.

Both these aspects of a relationship appear to be necessary to ensure the success of acquisitions.[31] We discuss each of these in turn below.

Contractual relationships

The contract is a written legal agreement between the parties which specifies the expected contribution of each partner, their benefits, duties and rights. It should also specify how risks are to be allocated and should pave the way for exit routes in the worst possible scenarios.

The contractual issues are most likely to be discussed during the negotiation phase. The problems and potential reasons for tension should be analysed in advance in order to design a suitable agreement which will prevent problems arising during the relationship. As one lawyer put it: "The negotiation process is a very difficult step. It is the process of divorcing whilst getting married".

Hence it is of paramount importance that legal support is accessed by both parties as soon as possible in order to minimise the risk of litigation at a later stage. One of the greatest risks in a relationship between 'asymmetrical' parties (e.g. large companies and small inexperienced ones) is the absence of appropriate legal support for the weaker party.24, 25

The main aim of the contract is to protect both parties, but, according to the professionals we interviewed it also has an important role in making the two parties feel at ease: "It helps both parties feel they are not being treated unfairly," said one OI Manager of a large firm.

What are the contractual options?

There is a range of contractual options for acquisitions based on the degree of commitment and involvement desired between the parties. At one extreme technology acquisitions can take the form of short-term contracts for R&D services, at the other they might involve a joint venture or merger/acquisition between the two organizations. These two extremes represent a sliding scale of commitment between the parties, in which both the level of control, and of the resources required, increases.

There is no one ideal contractual arrangement to govern an acquisition. The choice is dependent on a range of issues both inside and outside the firm, including the degree of market uncertainty, the novelty of the technology and whether the parties involved have prior experience of working together.

Firms tend to tackle different types of uncertainty with different contractual arrangements. When there is a great deal of uncertainty and turbulence in the external environment, flexibility and reversibility are more important than control. In such circumstances firms prefer to carry out small and reversible investments. Corporate Venture Capital (CVC) is often used to manage the acquisition of high-potential, new technologies held by start-ups or other small firms. Through this mechanism, a firm acquires an equity stake in the venture. If the technology delivers on its

promise, the investor is in a position to have first access to its application. Such an investment allows the firm to maintain a high degree of flexibility and also allows the option of withdrawing from the investment if the technology does not satisfy expectations or meet requirements.

While such an approach may be appropriate when there is high uncertainty, greater control may be considered necessary when the value of the acquisition opportunity becomes more certain.

Protection clauses

The contractual terms of the relationship could be made explicit in the contract or implied by statute*. The implied ones might sound obvious (for example, we generally know what type of duties, rights and responsibilities exist between us and the retailer when we purchase some petrol), but as many of them vary and depend on the national legal framework of different countries, it can be hard to know them all. It is common for firms to customize the contract to suit their specific circumstances and explicitly address individual issues.

Some standard agreements are published and constitute a good basis for customization (e.g. Lambert's modular agreements†). Extra clauses may be included in the contract to protect the parties from specific risks. These may be needed, in particular, when a technology is being co-developed, and the final outcome of the transaction is less clear.

Examples of issues covered by a contract include:

Parties changing their minds

A 'right to exit on notice at will' can be negotiated to deal with one party's change of mind. In cases where one party leaves, this can involve a termination payment to compensate the 'innocent' party. A right to terminate if one party breaches the contract (and is behaving in a manner inconsistent with the contract) is normal. These clauses serve as a protection mechanism for the 'weaker' party and discourage leaving the partnership. In an investment context, Corporate Venture Capital (or other investors) will insist that small firms which enter a relationship with a stronger and established firm include what is known as a 'good leaver/bad leaver' clause – a mechanism to allow them to recover shares from a founder who leaves the partnership before the objectives are met.

The warranties and liabilities clauses are essential. They are contractual promises and are designed to provide a clear statement on which each party can rely regarding key aspects of the contract, typically IP. Breach of warranty gives the innocent party a contractual remedy, generally damages. It is normal, as part of risk allocation, to put a cap on the liability of the parties. Thinking about 'worst case scenarios' should help in constructing exit plans for difficult circumstances, for example if one partner is taken over by a competitor.

Contracts can include the possibility of using arbitration, naming a neutral arbiter who can be called in to resolve disputes. These mechanisms are designed to avoid having to go to court and

provide a cost-effective process that helps to balance the relationship between small and large organizations.

Knowledge leakage

Confidentiality clauses can be included, for example, non disclosure agreements and limitations to publishing rights. Non solicitation clauses provide a legal barrier to prevent 'stealing' staff from the other party.

Lack of good faith

A 'negotiation in good faith' clause can be included for contracts made in countries where there is no such legal requirement. This clause has the effect of increasing the commitment of the parties to act in a transparent fashion.

Underperformance

A 'use it or lose it' clause can be an effective way to guarantee that parties who agreed to do something within a certain time will comply. It is a particularly useful tool in cases where the transaction fee is linked to the achievement of the final results of the collaboration. For example, if one of the parties will gain royalties from product sales in which their IP has been used.

Procrastination and delays in reaching agreements

In contracts which define an ongoing relationship mechanism, an 'endeavour to agree' clause must be included to encourage parties to agree key issues that arise in the future.

Third parties' rights

A clause could be placed in the contract to protect others with whom one of the parties has existing obligations.

For example, in the sample of case studies we observed one party in a transaction (the seller) was part of an association of firms. In the transaction agreement the seller made it a condition that the acquirer could not refuse to supply the products or technology to the other members of the association.

Future costs

Contract clauses can be included concerning possible future costs, for example the responsibility of the parties in relation to filing and maintaining patents.

Developing good relationships

A formal contract is not the only means of achieving a successful partnership or alliance. The less formal aspects of a relationship are also very important and these emerge from the social norms and level of trust that exist between the parties. A good relationship between the acquirer and the seller of a technology will create the flexibility needed to overcome any problems that

may arise during transactions and to deal with unforeseen events.

Trust is very important to any form of successful partnership. The development of trust between the parties is likely to require time (and hence implicit costs). Firms between whom trust has been well established are more likely to repeat collaborations in the future.

The establishment of trust requires information to be shared regarding existing problems and future plans. Acquirer and seller both need to be clear about each others' expectations and to understand each others' needs. Trust is particularly important in situations where the acquisition process has to occur over a long period of time such as in the case of co-development or outsourced development. A practical way to establish good relationships is to use 'softer' terms in an agreement which will leave room for negotiation, flexibility and adaptability in an evolving situation.

Ownership of intellectual property

An important point of debate for any technology acquisition is the ownership and control of the intellectual property (IP) relating to the knowledge generated or transferred. Ownership can take one of three different forms:

- The IP can belong to one party only
- The IP can be shared between the parties who collaborated to develop it. This might mean they co-own it equally or ownership could be divided up on a 'field of use' basis. Some parties might acquire rights to use, rather than actual ownership of the IP (see page 40)
- The IP can be owned by everyone and is donated to the public. In this case nobody has the legal right to exclude others from using the IP. This is the case with the Human Genome Consortium for example.

The ownership of IP can be difficult in relation to technology acquisitions, particularly where both parties contribute to the development. Debate over ownership has been accentuated by an increased interest in IP and commercialization by institutions that historically have been less concerned with owning IP rights. This is particularly true of universities in the US where the Bayh-Dole Act is now in force.

The growing interest in owning IP is putting legislators under pressure to expand patenting as a means of claiming ownership of more basic science principles. This is leading to the redefinition of the legal IP framework as disputes bring about refinements of the rules concerning what type of intellectual assets can be legally protected.

However, the often unduly emotive ownership problem can be solved by setting up an agreement in relation to distribution of the rights to use the IP

Joint IP ownership

Many large firms are firmly opposed to the idea of co-owning IP and have refrained from

filing joint patent applications with their innovation co-developers. They regard co-ownership as risky, as the future progression of a technology could be hampered if the owners cannot agree over the details of IP development. The agreement can be particularly difficult when partners operate in different geographic locations where IP regulations are dissimilar.

The large companies we interviewed generally prefer to fully own the IP, or failing this, to own the perpetual rights to use a particular IP for certain applications. The lack of ownership of IP does not therefore preclude the use of the IP. Getting the 'rights to use' for certain applications can compensate for the lack of formal ownership.

Open IP

In certain technological fields it could be advantageous to leave the IP open. This is the case, for example, where the IP relates to basic science, rather than technology, and where the advancement of the technology is dependent on the collaboration of parties with expertise in different disciplines. Open access to IP is likely to improve the chances of progression of downstream innovations, allowing easier access to knowledge by a number of innovators. For this reason, even commercial organizations sometimes do not want to have sole ownership of the results of a discovery. This happens particularly when they consider that the benefits of allowing the knowledge to be used by every potential innovator would increase the probability of delivering future innovations. An example of this is when Novartis, in collaboration with the Broad Institute of MIT, created a genetic codification of the causes of diabetes.[30]

A recent study[1] suggests four different ways to approach IP ownership, depending on the distribution of the knowledge (whether it is localized or distributed widely) and on the technology environment (whether it is calm or turbulent). The strategies are summarized in a table on the next page.