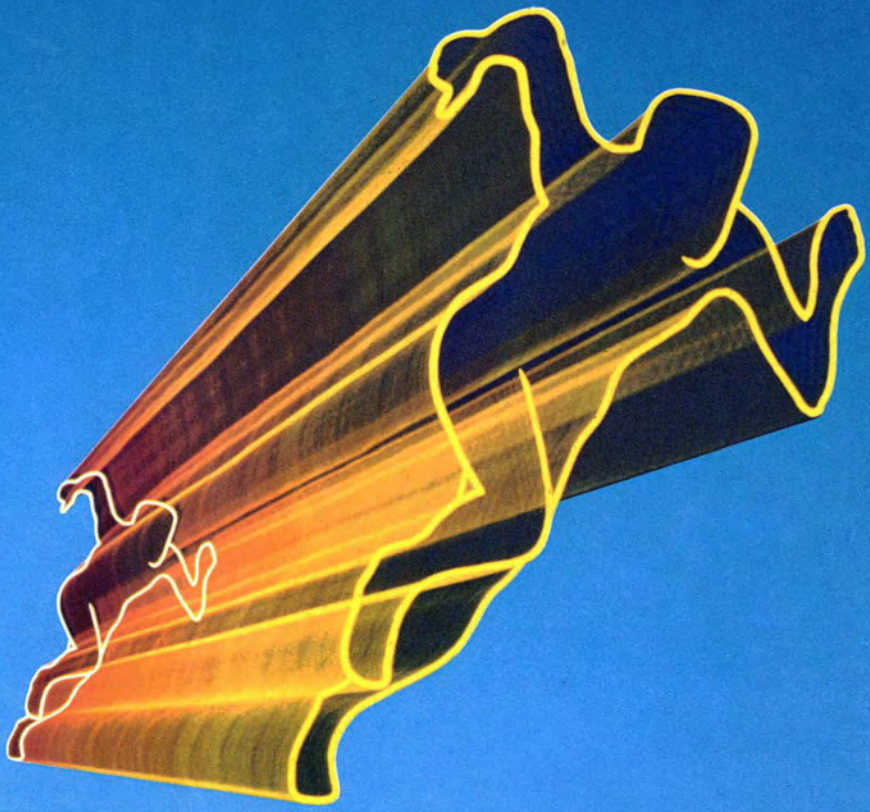
Deloitte Haskins + Sells High Technology Group



STARTING A HIGH TECHNOLOGY COMPANY

Strategies for success

Starting a High Technology Company

— Strategies for Success

Prepared in conjunction with Barclays Bank by David Connell BSc MA MSc MIMC of the Deloitte Haskins & Sells High Technology Group
London October 1985

ACKNOWLEDGEMENTS

The material for this booklet draws on the results of a programme of interviews with the founders and senior management of hi-tech companies which was carried out during 1984. Grateful thanks are due to all those who participated in these discussions, and to colleagues in Deloite Haskins & Sells and Barclays Bank for their many useful comments. Particular thanks are due to Matthew Bullock, for his many helpful comments and suggestions throughout the preparation of this booklet, to Bob Byrne of Barclays Bank, and to Gareth Stainer, John Belton and Ian Smith of Deloitte Haskins & Sells.

ISBN 0 86349 100 6

Photoset and Printed in England by
Greenaway-Harrison Limited, London.

Foreword

There is increasing encouragement to scientists and engineers to form their own businesses – from government and from the financial community. And there are many in universities, research laboratories and large companies who would like to 'spin out' in this way. But all too often the difficulties involved appear simply to be too great. Few people are in a position to offer investors even a partially developed product as a basis on which to build a business. Few can put together the well balanced management team which venture capitalists look for. And there is no doubt that many potential entrepreneurs are deterred by the risks and difficulties involved in developing and marketing a totally new product.

However, there are a number of other ways of starting a hi-tech company – ways which are easier and less risky. The purpose of this booklet is to help those considering starting a new R&D based business to think through the options systematically, and to develop an approach which maximises their chances of ultimate success.

Good Luck.

M.P.D. Bullock
Corporate Finance Director
Barclays Bank PLC.

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Chapter I – Introduction

The opportunities

For many scientists and technologists nowadays there are real opportunities to "go it alone". Specialist knowledge, technical skills, even pure intellect can all provide a highly prized commodity for which there may be a strong commercial market. And R&D projects undertaken for existing employers can often provide ideas for spin-off products.

Furthermore, small companies have an important role in the commercial exploitation of advanced technology. They tend to be more flexible than the industrial giant, and can be swifter at reacting to new opportunities. Rewards are closely linked to the individual efforts of their founders, and small companies provide a means of harnessing the entrepreneurial drive of the "product champion" – so important to the success of all innovations and new products.

And the markets are there. For example, mature businesses and Government departments are increasingly recognising the advantages which sub-contracting R&D to the small firm offers. Indeed some people have even argued that there has been a complete shift in the economics of industry, in favour of the small entrepreneurial company. Certainly the formation of new technology based firms has been a vital feature of the industrial scene in the United States since the 1950s. And a complex commercial, financial and professional infrastructure has grown up around these businesses.

This phenomenon has only quite recently been reflected in the United Kingdom and the development of venture capital has been slower. As a nation we probably have a rather different attitude towards entrepreneurial risk taking, and in the academic community there may traditionally have been something of a reluctance to get closely involved with commerce.

But these constraints have begun to fall away and the rate at which new hi-tech companies are being formed has increased rapidly since the late 1970s. This growth is most noticeable around Cambridge and along the M4, but it is also increasingly apparent in other parts of the country.

The opportunities for scientists and engineers to form new businesses are probably greater now than at any time this century, and those who can should be encouraged to seize them.

But there are problems. For example, new technology based companies have a number of common characteristics which make their management difficult. And despite the undoubted increase in opportunities, most sectors of the industry continue to be dominated by large companies. So the small hi-tech company must develop a *strategy* which takes full account of large companies' greater financial, research and marketing strengths, if it is to establish a viable long term position. It must be a strategy which is firmly based on its own strengths and capabilities.

Here we look at *starting* a hi-tech company – about the first two or three years of operation. A second booklet – on *Strategies for Growth in High Technology Companies* – looks in detail at longer term issues. But in deciding how to start, you must also consider what type of strategy will secure your long term future, and the type of operation, and style of organisation which you wish to develop. It must be a strategy with which you, as founder of the business, will be comfortable, but equally one which meets the challenges of the marketplace.

Types of high technology company

This booklet is primarily concerned with *R&D based businesses* – businesses devoted to the translation of new science into marketable products and services. Their success or failure depends fundamentally on the quality of that R&D, and on the effectiveness with which it is managed and marketed.

The hi-tech companies of which everyone is most aware, are those selling *products* to end users – where spectacular innovations can open up enormous new markets affecting millions of people directly.

In fact this is just the tip of the iceberg. Many hi-tech companies are highly specialised, with only a few key customers. Intra-industry trading is a predominant feature of the market, with major companies buying in goods and *services* from a number of smaller hi-tech companies. Government departments, and particularly the Ministry of Defence, are major purchasers in many sectors of the industry. In fact, defence procurement accounts for one third of the output of the electronics industry.

Other types of business are also commonly labelled 'hi-tech', because they *distribute* or *manufacture/assemble* "hi-tech

products". Such businesses may share some of the characteristics of R&D based firms (e.g. short product lives, entrepreneurial management and rapid growth) but the prime focus of their management must be on other factors, like the cost efficiency of the overall operation, and the effectiveness of their sales organisation.

The booklet does not discuss businesses which are engaged purely in manufacturing or assembly. But as distribution can sometimes provide a useful adjunct to R&D based business activities, and some entrepreneurs see distribution as a stepping stone to developing their own hi-tech products, the characteristics of hi-tech *distribution* companies are covered briefly.

Hi-tech risks and difficulties

The components of risk

One of the main questions which you should ask yourself if you are thinking of starting a new business is "what are the risks and costs of failure?" It is a question which your backers will also want to consider – be they friends, bankers or venture capital investors.

The level of risk involved in any start-up depends on three factors:

(a) investment required;
(b) uncertainty;
(c) management difficulty.

In developing a start-up strategy, you need to consider the likely problems which your business will face under each of these and plan how to cope with, or avoid them. The key issues are discussed below.

Investment required

This means cost of market entry, including the cost of research and development, the costs of setting up production facilities, marketing and distribution networks, and financing stocks and working capital.

The amount of money you need depends on the type of business you want to start. Developing new products can be particularly expensive – besides the development work itself, huge sums must often be spent on marketing, either to break into an existing market

or to create a new one. Development overruns are common, and sales frequently take longer to take-off than anticipated.

Getting start-up finance from banks is made more complicated by these uncertainties, and by the absence of either security or a track record. Venture capital depends on neither of these, but nor is it particularly easy to obtain. And for many forms of start-up, other types of finance are more appropriate.

Uncertainty

This is about the likelihood of the venture being technologically successful, of the product or service finding market acceptance, and of the business being able to maintain a long term competitive edge over other similar businesses.

Risks of new product development

Research, development and innovation, by their very nature, involve a high degree of uncertainty as to the outcome. There are five separate aspects of this:

- the technology proposed might not be capable of being applied in the way you envisage;
- the company might not have the technical and management skills to carry out the R&D programme required;
- the market envisaged for the product might not exist, or it might be structured in a way which makes entry almost impossible;
- the product might be inferior to competitor products also being developed;
- the finance for the project might become exhausted before it has begun to generate income.

Short product lives and rapidly changing markets

New technology-based firms thrive on rapid technical change. But this can also mean that products are swiftly superseded by those of competitors. There may be only a short time for companies to realise a return on their investment in R&D. It means seeking high margins when products are first launched, and being ready to reduce prices as competitor products emerge.

It also means monitoring competitors closely, and devoting a continuing high level of R&D effort to generating replacement

products. And in the longer term it means being ready to respond to the increase in competition which occurs as markets expand and mature.

Management difficulty

All successful businesses must be well managed. Hi-tech ventures can be particularly complex because of the wide range of management tasks that founders must perform, whatever their background.

Managing the R&D process

Research and development is notoriously difficult to manage. It is usually hard to estimate project costs and timetables in advance. And judging progress against those timetables is often harder still. Effective project management requires a discipline which creative people often find stifling. And it demands from managers a willingness to put aside their personal R&D interests.

Technically orientated management

The strength of any hi-tech business is its people. It is on their technical knowledge, creativity and marketing flair that continuing success depends. But this strength inevitably means that the founders of hi-tech companies may often lack in-depth commercial experience.

All entrepreneurs have to learn on the job to some extent. But it takes most people several years to acquire the management skills needed to run a medium sized business. The rate at which hi-tech companies can grow leaves little time for learning those skills. In any case, as founder of a hi-tech business you may not want to devote more and more of your time to general management. You might feel that your talents are better used by concentrating on the technical or marketing sides of the business.

Rapid growth

The successful hi-tech company can grow extremely rapidly. For example, sales by the US firm Microsoft grew from 8 million to 100 million dollars in four years, after IBM had adopted the MSDOS operating system for its personal computer. In the UK, Acorn Computers achieved an annual turnover of almost 100 million pounds just six years after its formation.

But growth brings its own special problems. Managing it takes

time and puts severe pressure on the management team. Perhaps more important, the way in which a business is organised, managed and controlled needs to change significantly as it expands, and as its activities develop. For example, a business employing 50 staff needs to be managed in a quite different way to the business of 20. And running a production operation requires different skills from running an R&D operation.

An important longer term issue is how to maintain an innovative environment as the business becomes more structured and more commercial. This is essential if the company's long term competitive position is to be ensured. And retaining key R & D staff can become a problem as the business gets larger and more impersonal.

Most people are happiest managing a particular size and type of business. Some are most effective during the start-up phase, when the business probably employs less than 20 people. Some are better at managing the rapid growth which can follow, and at introducing the more formalised approach to management which is then required. Others are more at home running larger, more established businesses with a number of different operating units. Different styles of management are required in each case. Few entrepreneurs have the ability, or indeed the desire, to take a growing business through all these transitions.

So hi-tech entrepreneurs must re-evaluate their own management skills, and those of the management team, as the business develops. It is important to ensure that the way in which the business is organised and managed evolves hand in hand with its overall state of development. And you must be prepared to hand over the reins to the next generation of management if you realise that you are approaching the limits of your own management ability.

Reducing the risks of failure

There are three ways in which you can increase the chances of your start-up being a success:

— by careful planning;

— by getting appropriate and adequate finance;

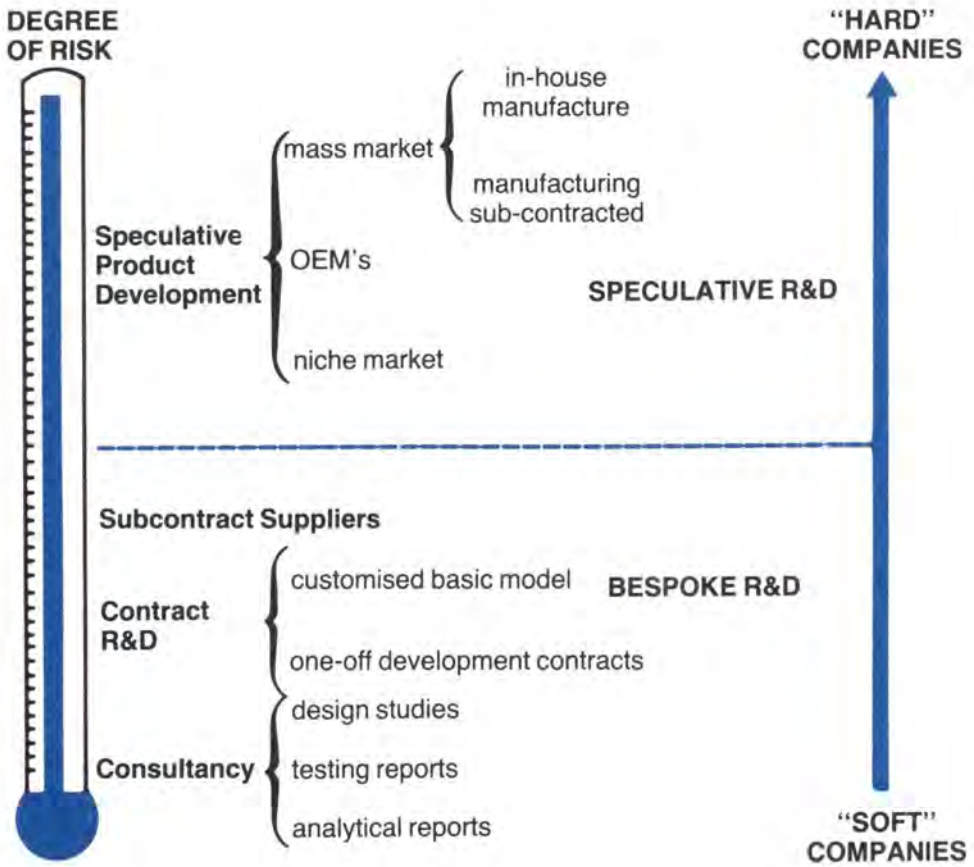
— by adopting a strategy which is consistent with your own management skills, or which is itself low risk.

So it is important that you understand the nature of the risks that your start-up strategy entails. This is the first step to finding ways of reducing them.

Often you will find that, by adopting a lower risk strategy, you also reduce the financing problem, and make starting your own business seem both more practical and more attractive. When you are developing your start-up strategy, you should try to assess the risk involved under each of its major components – the *investment* required, the *uncertainty* and the *management difficulty*. You may well find that by modifying your strategy in some way, you can reduce the risks entailed.

The next chapter examines different start-up strategies that are available, focussing on key risk factors.

Exhibit 1 — Relative riskiness of different forms of R&D start-up



Chapter II – Start-up strategies

The options

People from many different types of background start successful high-technology companies – be they entrepreneurs with no formal scientific education, or university professors. And a scientist or technologist thinking of starting a business often has a choice of several different options. In fact, there are enormous variations in possible risks, in potential rewards for success, and in the finance required to start.

The type of business you are best placed to form depends a lot on the kind of job you are doing now. Designing and marketing a revolutionary new hi-tech product from scratch is only a possibility for relatively few people. In deciding what sort of business to develop you must look at the risks and difficulties entailed in each of the options which are open to you, in relation to your own skills and experience.

Exhibit 1 illustrates the level of start-up risk typically associated with different types of R&D based business. It combines the three aspects of risk identified in Chapter I – the investment required, the degree of uncertainty entailed, and the management difficulty involved.

Soft companies

Soft companies* – those involved in contract R&D or consultancy activities – tend to involve much less risk than "hard" companies, as the bespoke nature of their activity immediately removes much of the market uncertainty associated with speculative product development. And within that broad grouping there are a number of different sub-categories of business.

Consultancies

Consultancy businesses are probably the easiest and cheapest type of hi-tech company to start. Little or no specialised equipment may be required, and even when it is, the client's own may well be available. It is often possible to work from home or from cheap, rented premises. Many academic founders of hi-tech businesses

*The terms "hard company", and "soft company" were first used by Matthew Bullock in "Academic Enterprise, Industrial Innovation, and the Development of High Technology Financing in the United States", Brand Brothers (1983).

start by doing consultancy work on a part time basis, perhaps for government departments or commercial companies, sometimes making use of university equipment when it is not in academic use.

Consultancy businesses can usually be developed on a very gradual basis, as contacts are built up. This makes their management relatively straightforward, at least in the early stages of development.

Contract research and development

A contract R&D business is a firm that designs equipment or software to specific contracts for individual customers. Its income is assured if it can obtain and fulfil contracts satisfactorily.

The risks involved in starting up such a business are greater than for consultancy. More investment is usually needed and contracts tend to be larger and harder to come by. There is also the difficulty of managing R&D projects within budgets, and to client deadlines. And the equipment or software developed will usually need to meet high standards of reliability. However, the overall risk involved is obviously much less than for comparable speculative product development.

One of the most well known of the U.K.'s university spin out companies – Oxford Instruments – started in this way in 1959, with the design and construction of high performance magnets for research purposes.

Sub-contract supply

The difference between a contract R&D company and a sub-contract supplier is in the extent of the routine manufacturing and assembly operations involved, and in the degree to which the product has become standardised. Setting up production facilities usually requires a good deal of investment, and you have to have skills in production management as well as R&D. There are also the costs of obtaining contracts in the first place, and the inevitable risks of dependence on a limited number of customers.

Hard companies

'Hard' companies are those which develop standard products with no guarantee that there will ultimately be a market for them. This sort of R&D is obviously very risky. And the larger the market,

the more money you are likely to have to spend on development, and the greater the competition which you must expect. The rewards, however, can be enormous.

Hard companies require a more comprehensive range of management skills than soft ones, especially where manufacturing or assembly is in-house. This increases start-up costs, as well as the overall difficulty of managing the business. The investment required and the level of risk involved is also influenced by the size and type of market in which the company is engaged. There are three broad types:

— Niche markets.

  Small, specialised markets – or 'niche' markets – are the easiest for new companies to penetrate. They tend to require a strongly technical approach towards marketing, and competition is often quite limited.

— OEM contracts.

  An Original Equipment Manufacturer (OEM), is a company that buys in components from other suppliers for incorporation into its own products. In this respect the title is perhaps something of a misnomer. Negotiating OEM contracts with a limited number of major customers provides a way of simplifying marketing and reducing risks. By selling to OEM's, a small hi-tech company greatly reduces the size of its marketing operation.

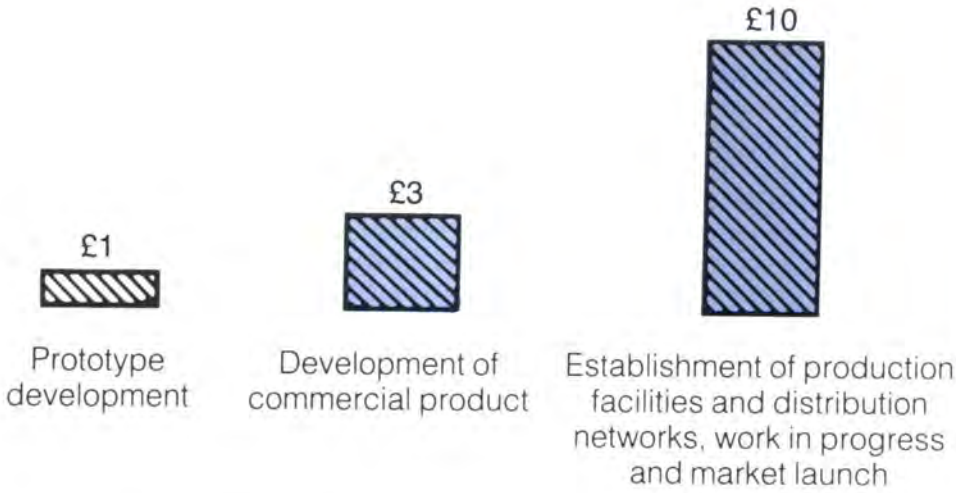
— Mass markets.

  Mass markets (especially consumer markets) are usually much more demanding. Sophisticated, expensive advertising may be required to launch new products. In fact the larger and faster growing a market is, the more competitive marketing is likely to be, especially if large, established companies decide to enter it. So developing new products is a very risky endeavour and, though the rewards for success are great, those attempting this strategy must adopt a highly commercial approach to business management if they are to remain competitive.

Exhibit 2 – Costs of product development – the "One-Three-Ten rule"

It is very difficult to estimate in advance the costs of developing a new "hi-tech" product. Ideally you should make a detailed assessment of the time and costs involved in each stage of the development and check it against the breakdown for similar projects. But often there are no precedents to hand which can be used in this way.

The "One-Three-Ten" rule has found some favour in the electronics industry as a simple rule of thumb for checking cost estimates.

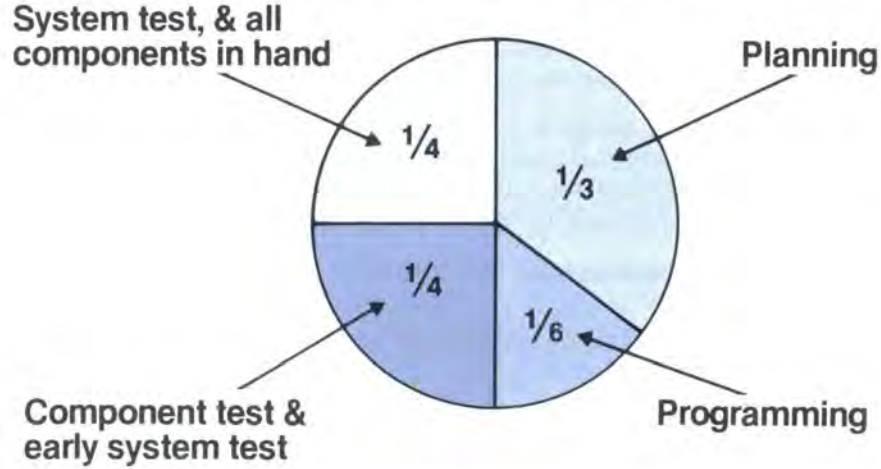


The rule states that for each £1 that is spent on designing a prototype, it will take a further £3 to convert it into a marketable product. An additional £10 will be required before product launch – to cover the costs of setting up production, distribution and customer service facilities, together with the investment in working capital.

As a rule of thumb, it serves to emphasise the importance of the later stages of product development – and to highlight costs which are frequently underestimated by scientists and engineers. It is important, however, for each project to be evaluated individually as there are wide variations about the general pattern. Ratios of 1:3:20 and even 1:10:100 are also quoted.

Exhibit 3 – Developing computer software

Frederick P. Brooks Jr., father of the IBM System/360 developed a simple rule of thumb for scheduling software tasks: –*



Similar rules are in use in most of the large software houses. But scientists and mathematicians, used to developing software tools for their own use, often adopt a much more interactive approach – solving problems and testing as programs are developed. This leads to software which works well in a research environment, where you have to fix your own bugs, but which leads to programs which are inefficient and difficult to support. A more structured approach to program development is required in a commercial environment, using formal techniques of project management.

Mixed businesses

Some companies attempt to mix both contract R&D work and the development and marketing of standard products. Indeed many harder product companies have developed out of soft start-ups. But mixing these activities requires very careful management. The

*The Mythical Man-Month, Essays on Software Engineering; Addison-Wesley Publishing Company, 1975.

demands of R&D, manufacturing and marketing are quite different. And conflicts of priorities are frequent. Hard, product-orientated companies tempted into contract R&D are liable to end up developing customised products with inadequate profit margins, while undermining their own product development strategies. Soft companies are prone to underestimate the costs of developing and marketing standard products. And it can be difficult to introduce the disciplines required to run a major manufacturing operation.

Despite these dangers, the tendency towards a hardening of business activity is a major characteristic of the hi-tech industrial scene. It is discussed in more detail in *Strategies for Growth in High Technology Companies*.

Distribution companies

The essence of many distribution businesses is supplying customers with small quantities of a range of products which they buy in bulk from manufacturers.

This booklet does not give detailed advice on how to run a distribution business – its prime concern is with R&D based businesses. However, a number of companies have developed their own products on the back of a business orginally set up to distribute hi-tech products. And some R&D based businesses get involved in distribution as a "second string".

There are many different types of distribution activity and the risks vary considerably. Avoiding product development obviously eliminates one important element of the risk entailed in R&D based companies. But this is replaced by the commercial risks arising from the tight margins and highly competitive markets in which distribution companies typically operate. With careful management the risk is probably about half-way up the risk scale shown in Exhibit 1 on page 8. However, if the company has to hold large amounts of stock, this can increase the risk significantly.

Anyone considering starting a pure distribution business as a base from which to develop their own products should consider very carefully the different success factors involved. Though some companies have successfully made the transition (Apricot Computers is a prime example), few people have the management skills to run both sorts of business,

Value added distribution

There is one form of distribution which is perhaps of more direct interest to the research scientist or engineer. It involves customising a larger company's product for distribution to a particular market. Such companies are best classified as "value added distributors" because, by adapting the product in some way, they are essentially adding value to it.

An example of this form of activity is marketing computer hardware combined with specialised software developed for a particular market. This provides a valuable service to hardware suppliers, as it helps them to penetrate specialised end-user markets. The value added distributor is in many ways operating like an OEM, although with much greater dependence on the hardware supplier.

The advantage of this strategy is that it can enable you to obtain income, both from the value which your business has added to the basic product, and from the margin earned as a distributor. And there can be some useful cash flow effects because obtaining favourable credit terms from suppliers reduces the need to finance working capital from other sources, and increases the rate at which the firm can grow.

Starting this sort of business is very similar to starting a normal 'hard' company, although by building on an existing basic product, the costs and risks can be reduced.

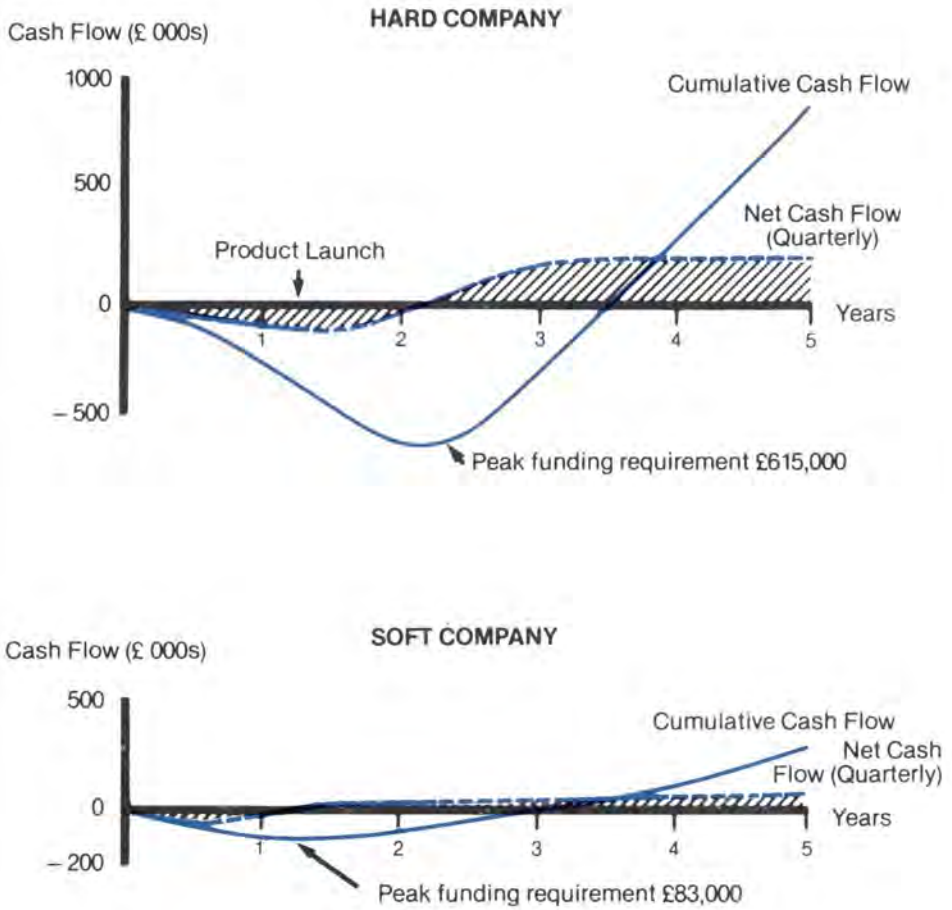
The costs

There is a wide variation in the investment required for the different strategies outlined so far, particularly between the softer and harder forms of start-up.

Typical cash flow profiles for hard and soft companies are shown in Exhibit 4. The amount of finance required – the *peak funding requirement* – essentially depends on the depth of the loop. This represents the amount of money that the company has absorbed before starting to generate a net positive cash flow.

Hard companies generally cost hundreds of thousands of pounds to set up; some cost more than a million. Products rarely take less than 18 months to develop and launch; development work must be completed and production facilities organised; marketing, distribution and customer service networks must all be

Exhibit 4 – Typical cash flow profiles for hi-tech start-ups



established; and money must be invested in stocks and work in progress. And the market for many hi-tech products is international. UK companies must build up a marketing presence throughout the main industrial nations of the world if they are to remain competitive in the longer term.

Operating as a *value added distributor* reduces these costs to some extent, especially if suppliers can be relied on for customer service. However, there is still an important element of product development involved.

Soft companies avoid many of the start-up costs incurred by hard companies. For example, customers pay for the R&D work and there is no need to set up expensive distribution networks or incur high advertising costs. So the initial financing investment can be quite small – just enough working capital to run the business until customer payments begin to come in, together with the costs of any equipment. It is often sufficient to rely on personal savings and bank finance.

The cost of starting a *pure distribution* company depends on the precise nature of the operation, but the amount of capital required can be quite small. And as no R&D is involved, income is generated more quickly than with hard start-ups. The shape of the cash flow profile is therefore rather closer to that of the soft start-up.

Some entrepreneurs adopt a soft, or distribution start-up and then use the income to fund later product development. This is a natural strategy for technology companies to adopt, and one to be encouraged. However, such *transitions* can be difficult to achieve in practice. Anyone planning this approach must have a very carefully worked out strategy, which takes into account all the implications of making the change. Transitional strategies are discussed in detail in *Strategies for Growth in High Technology Companies*.

Various strategies are available to reduce the depth of the hard company financing loop. Companies set up to exploit ideas or products which have already been partially developed (for example, in a university) save a proportion of total R&D costs. Subcontracting can cut down the investment required in manufacturing or assembly. And by selling through OEM's or in the case of consumer products, using mail order, marketing and

distribution costs can be kept low. Many start-up companies use these approaches to reduce the cost of actually getting into business. And these strategies can also make management somewhat easier.

Making a start

Most new hi-tech companies are "spin-outs" from larger organisations. But making the transition from full-time employment to running your own business can be daunting. It will affect not only you, but your family as well. The more gradual this process can be made, the easier and less risky it is likely to be.

Setting up a new business also takes a great deal of time – to evaluate the options and draw up a business plan, and to discuss it with co-founders, advisors and financiers. Some organisations, notably university departments, provide an environment in which this preparatory work can take place easily. In others it is very much more difficult.

Product-based businesses (hard start-ups) are the most difficult to set up. Most, therefore, are based on ideas developed under the wing of an existing employer.

Knowingly or unknowingly the larger organisation can act as a sort of *incubator*, providing the spin-out team with both time and the use of equipment. This enables them to shelter the costs of developing the idea for the new business to the point at which they can obtain finance.

Academic research projects sometimes lead directly to new products. Meta Machines Ltd in Oxford is an example of this. The robot welding equipment which it has developed is based on a £250,000 university research project led by one of its founders.

Starting a business from the shelter of a university research department can save a lot of money. But one product does not make a business – at least, not usually. Don't forget that you will have to recover all the development costs of subsequent products. You may no longer have free access to university staff, equipment and services. And nearly all research involves going down blind alleys from time to time. You will have to pay for all of this yourself.

It is more difficult to spin out from a commercial or industrial environment, where your employer usually has some right to ideas for new products arising from work on his behalf. Some companies are prepared to assist employees wishing to form new companies – for example, to develop a product outside their core business interests. But these are still in the minority.

Consulting work can sometimes provide a useful source of income during the transition period, while ideas for a more substantial business are being developed.

Obviously, if you are thinking of setting up a hard company on the back of a research project you need first to establish who has the rights to the intellectual property on which your product is to be based. And you must establish some form of exploitation agreement with the body or bodies concerned. You must also take care that you understand the significance of your contract of employment if you pursue your own development projects. Some employers are more flexible than others.

Another option, if you already have a product, is to have it marketed under licence by an established company. This is useful if the product cannot in itself support a new business, or where you do not wish to take on the risks and responsibilities involved. You can, of course, use the income to finance the development of some other business activity. But negotiating licensing agreements involves many dangers. If you are contemplating this route, make sure you consult a solicitor with experience in this field before approaching potential commercial partners.

However, most people who wish to start new hi-tech businesses do not have firmly researched ideas for products. So they are unlikely to be in a position to attract venture capital funding. Contract research and consultancies do not suffer from this difficulty. Such businesses (soft companies) offer some important advantages. And they can provide a route to more product-based businesses later on, providing the transition is carefully managed.

Academics

In the case of academic scientists, starting a soft company is often just a natural extension of the research or consultancy work which they are already doing from within the university.

Starting consultancy work as a part-time business can be of enormous value to any academic with a yearning to form a business. Besides providing some experience of the basics, it also provides a wider exposure to the commercial world with only minimal risk. And it makes it possible to build up contacts and market knowledge gradually, so that it becomes easier to make the transition out of the academic environment into the commercial world when the entrepreneur feels ready.

In fact as a general rule, the more preparatory work that you carry out before actually launching a full time business, the greater the chances of success.

Chapter III – Organisation, management and operations

The different types of company described in Chapter II have quite different styles of operation. So they require different kinds of management and rather different forms of organisation to make them successful.

Soft companies

Soft companies can operate effectively with only a very small staff. There are many successful one-man consultancies. And as they grow, they continue to operate, to an extent, as a federation of individuals and small teams, each undertaking discrete projects on behalf of specific clients. There is less need for a tight organisation structure than in other types of business, at least during the start-up phase. And there is no immediate need to recruit specialist management. If the founders can bring complementary management skills to the business, this is obviously highly desirable, but it is not usually as important at this stage as it is for hard companies.

The first non-technical recruit should normally be a first class personal assistant, to undertake secretarial duties and help with a variety of administrative tasks. The services of a good outside accountant, and perhaps a part-time book-keeper, are quite adequate for maintaining financial control during the early stages. And as marketing depends on how well the firm's principals can sell their own skills, there is no need to recruit specialists. Founders usually share other general management functions – planning, recruitment, personnel, and administration.

Being able to get on well together is important in any start-up, but there is a special factor in soft start-ups – everyone has quite similar roles. To a large extent they are free to build up their own areas of business activity within the shared commercial and cultural environment which the firm provides. So mutual trust is important. And everyone in a soft business needs to work hard to maintain that trust as the business grows. Good internal communications are essential to prevent fragmentation into separate business units later.

Soft companies tend to grow gradually, taking on additional scientists and technologists as they expand. Growth rates can be quite rapid, firms frequently reaching 50 professional staff within five to seven years. After that the maximum rate of growth that can

be achieved readily is probably about 25-30% per annum. Above this, it becomes increasingly difficult to absorb new staff and make organisational changes.

The tendency for soft start-ups to become gradually harder has already been described. And many entrepreneurs set up soft businesses with the specific intention of hardening into products later. But this increases both the management difficulty and the financial exposure of the company, so there is much less room for management error than in soft business. If this is your plan, you should bear in mind the speed at which the transition is to take place right from the start. It may affect both the constitution of the founding team and subsequent recruitment. It is important to have the necessary management skills in place *before* the transition begins.

Hard companies

Though high by normal standards, the growth rates achieved by successful soft companies are much slower than those that can be achieved by successful hard companies. And hard companies can also generate higher rates of turnover and profit per head.

In fact, this is one of the principal advantages of the hard start-up – it can offer a much quicker route to Millionaires Row! (Though many entrepreneurs are motivated as much by the satisfaction they obtain from making and selling products developed from their own ideas.)

Hard companies involve a much more comprehensive range of operations than soft ones. Besides R&D, they must market the products they produce and manage distribution, production and customer support.

Perhaps the most important issue is the greater breadth of management skill required. Few people have enough experience to start a hard company without the support of a complementary management team. And the individual who tries, runs a higher risk of failure. So the minimum size for hard company start-ups tends to be much larger than for soft start-ups. And the entrepreneur who founds one must either have, or rapidly acquire, the general management skills to deal with it.

Financial control also needs to be more sophisticated. Stocks and work in progress must be controlled, debts collected and cash flow managed carefully. Hard companies usually require a full time finance director at a much earlier stage of development.

Particular attention must be paid during the start-up stage to the rate of spending – sometimes referred to as the "burn rate". It is important to monitor this against budget and project management has to be very tight (see Exhibit 5). And you must ensure at the same time that product development is on schedule, and that marketing and distribution networks are being built up in line with the business plan.

Companies making products have the additional issue of managing production. R&D people generally make very bad production managers. Quite different skills and attitudes are required. R&D people enjoy solving new technical problems; production management requires a continued commitment to

Exhibit 5 – Project management

The key to the success of hi-tech companies is their ability to convert new technological developments into commercial products or services. And it is the creativity of the company's scientists that underpins this process.

At the same time, the development process itself must be very tightly managed if new products are to be brought to market within budget and ahead of competitors.

Good project management is absolutely essential in R&D based companies, but it is especially important in hard companies. Without this discipline, overruns can easily occur, and products may be overengineered, as scientists struggle to achieve a degree of perfection which is not commercially justified.

The techniques of project management involve six key elements:—

(a) clear technical and cost specifications, based on the overall objectives for the project and a careful analysis of what must be achieved to meet them;

(b) detailed planning of the tasks involved and the resources to be used in undertaking them (i.e. people, finance and equipment);

(c) organising those resources in a way which enables them to be coordinated effectively;

(d) milestones, with clear outputs, against which progress can be checked at intervals during the development programme;

(e) disciplined and regular progress monitoring with regular re-estimating of the time to completion;

(f) formal mechanisms for suthorising changes to the product specification or to the development effort planned.

Scientists often find it difficult to adopt this discipline, especially those from, say a university background. Academic research projects are usually run in a rather informal manner, with the accent on individual creativity rather than meeting deadlines.

A strong degree of informality must always be retained in hi-tech companies. The exchange of information between different parts of the business is vital if the business is to continue to find new ways of solving technical problems and develop ideas for new products.

Some degree of creative licence of the company's scientists is essential to foster this process. However, it is important to control it within clear guidelines, so that the amount of time spent on longer term development work is kept in check, R&D is focussed on the strategic objectives of the business, and priority projects are completed as quickly and efficiently as possible.

operational efficiency. Specialists must be recruited to handle this area, and the interface between R&D and manufacturing needs to be managed with great care.

The environment must combine encouraging creativity and innovation (needed during the early stages of product development) with very tight project management (in the later stages, and for day to day manufacturing and marketing operations).

Besides reconciling these different needs, it is important to ensure that development work does not spill over into the production engineering stage. Repeated design alterations can easily lead to serious production delays. Often these are for the simplest of reasons, such as a failure to recognise that modifications to the design of a piece of equipment also call for changes to other components.

Development engineers and production management must work closely together right from the start of a project to ensure this sort of problem does not occur. And besides agreeing a project plan which covers both sets of activities, they should also discuss ways of designing the product to keep costs down and make it easy to manufacture.

Use of subcontractors

One way around some of these difficulties is to subcontract manufacturing operations. Besides reducing the management problem, it also helps cut market entry costs.

Subcontracting has always been a feature of the engineering industry. But some computer and electronics equipment companies now subcontract their *entire* manufacturing operations to specialist suppliers. A whole new breed of subcontractors has grown up in the UK and overseas to meet this demand.

Advantages

Using subcontractors gives the small hi-tech company five important benefits:

— efficiency – it enables it to gain access to efficient manufacturing and assembly operations;

— lower risks – it reduces the investment required to launch

new products (and makes market withdrawal easier and reduces the overall financial risk);

— faster growth – it enables quicker diversification and expansion;

— flexibility – it helps preserve the small company environment of R&D based firms, and maintains flexibility;

— easier management – it reduces the need for production management skills and makes the business easier to manage generally.

But it is important to remember that using subcontractors does not absolve you entirely from the need to plan and control the manufacturing operation. You will need to select which subcontractors to use; and be able to monitor their performance. You must have access to some form of production expertise to do this effectively.

Before entering into any agreement with subcontractors you need also to think through the financial implications of different forms of contractual arrangement – on working capital, cash flow, costs and risk – since there is usually a trade-off between flexibility and profitability.

Disadvantages

Subcontracting also has three major disadvantages:

— Dependence on outsiders

The overall success of your business becomes heavily dependent on outsiders. Second sourcing can help to reduce this, but it cannot remove it entirely. You should assure yourself of both the technical capabilities and the financial viability of potential subcontractors before deciding to use them. This means speaking with their existing customers, if you can, and checking their credit rating.

— Loss of control

You will lose some degree of control over quality. There are large variations in the standards of quality control achieved by subcontractors. So you must establish clear quality criteria and checking procedures at the outset. Performance should be regularly monitored against these.

— Loss of profit

You do not earn the profits on the manufacturing process – they do. This is fine when you are selling products which are still highly novel, so that prices depend on how products compare technically with competitors. But as markets mature and product differences are reduced, price becomes the key factor in competition. It is then the cost efficiency of your manufacturing process which largely determines the profitability of your business.

Distribution companies

The extent to which distribution businesses depend for their success on technical expertise as opposed to efficient commercial management varies substantially.

Typically, they operate on very fine margins and their profitability tends to depend on their overall commercial efficiency. The same applies to many more specialised wholesalers and retailers. Salesmanship and technical knowledge is very important, but ultimately three basic commercial factors dictate how profitable the business will be:

— the distribution margins that are available;

— the amount of credit given by suppliers (and the amount that the business in turn grants customers);

— the overall cost efficiency of the operation.

Technical expertise becomes more important when a distributor is concerned with selling complex assemblies or proprietary components to OEM's. A key element in the business is assisting the OEM to "design in" the distributor's products . The selling process may take place over a period of months, and considerable effort may be required to demonstrate the benefits of using a particular component. As a result many manufacturers of hi-tech products grant sole distribution rights to a single company in the countries in which they trade. Margins are usually higher for franchised distributors of this type, but manufacturers expect a high quality of technical selling effort in return.

In fact the whole business is likely to be underpinned by your success in securing sole distribution arrangements with suppliers of quality products, and on the commercial aspects of those deals.

Financial control is very important in distribution companies as margins are often slim. And the short product lives and uncertain

markets associated with hi-tech products mean that it is easy to build up stocks of obsolete or over-priced products. The general rule is to play safe and hold as little stock as the operation requires. And you should try wherever possible to take stock "on consignment", or negotiate buy-back agreements with your suppliers to cover obsolete items.

The relationship between distributor and component supplier is often very close. A typical agreement might include:

(a) provision for the return of all unsold new products for a period (say up to one year);

(b) agreement by the supplier to buy back a proportion of stocks supplied to the distributor in each subsequent year;

(c) an agreement by the manufacturer to issue a credit note to cover any decline in value of the distributor's stocks after a price reduction;

(d) agreement by the manufacturer to support special discounts in certain cases;

(e) a cost sharing arrangement for approved promotions.

In return for this support the manufacturer is likely to ask for detailed information on the distributor's sales, with a regular analysis by customer and product.

Distribution companies also need highly efficient order processing and stock management systems, as service and speed of delivery is usually very important to the customer.

These factors tend to dictate the kinds of people best suited to starting distribution businesses; salesmanship, and organizing ability are essential, together with experience of similar operations if at all possible. And strong financial incentives are required if you are going to get the best from your sales staff – incentives which are directly linked with individual performance.

The tight cost control and aggressive salesmanship required for distribution companies is in stark contrast to the more open management style typical of R&D companies. This underlines the difficulties of trying to combine the two operations.

Fortunately, value added distribution rarely involves handling large volumes and so there is less need to take on the highly efficient commercial management apparatus of pure distribution.

Chapter IV – Marketing

Soft companies

The opportunity to start an independent consultancy or contract R&D business often becomes apparent through founders' existing jobs. Personal contacts that they have already established, plus their industry reputation provide them with the initial market for their services. Marketing in soft companies is basically about building on this position. In the early stages of development it involves trying to extend these contacts. Otherwise, obtaining publicity in the trade press, and possibly giving occasional talks, are the most appropriate ways of promoting your services.

Soft companies exist by offering a specialised service, using skills and expertise that is in short supply. Their marketing must therefore focus on the quality and special characteristics of that service. And they must be highly responsive to individual client needs.

The markets into which they sell tend to be much more stable than product markets, principally because skills do not date so rapidly. Pricing is also more straightforward – either on a cost-plus basis, on cost plus fixed fee, or through fixed price tenders based on individual daily charge-out rates. Great care must be exercised in pricing to ensure that overheads and "non-chargeable" time is fully recovered. This includes time spent on marketing, any internal projects, administration, training, sickness and holidays etc. And if your business is involved in subcontract manufacturing, obviously you must include an element for materials and the use of equipment and machinery. There should also be a sufficient surplus to fund growth. Fixed price contracts should be avoided when you are not on familiar ground.

Perhaps one of the biggest problems is actually identifying potential customers and finding the time to sell to them. There is an inevitable conflict between marketing and work on current contracts. Principals must put a continuing investment into marketing in order to smooth out peaks and troughs in workload and ensure that the business grows. But, this must be achieved without allowing existing contracts to suffer.

Hard companies

Marketing products requires a much more sophisticated approach. Prices depend on what the market will bear. And they

must be allowed to respond to competition as it evolves. Advertising must be carefully targetted at potential purchasers. Market feedback must be closely monitored and used to influence product development and marketing policies. And hi-tech products rapidly become obsolete. A steady stream of follow-up products is necessary if the company is to be more than a one-product wonder.

Market entry

Hard companies must either break into an existing market or create an entirely new one. In both cases the strategy to be adopted needs careful thought. There are three distinct possibilities:

— a *"niche" strategy;*
— a strategy based on a high degree of *product differentiation;* or
— a strategy based on achieving *cost leadership.*

Niche strategy

The new start up is most likely to be successful if it offers a product which meets a highly specialised market need in a way which offers the customer significant cost or performance benefits. By aiming for a small, but specialised market, price competition is likely to be limited. This is important for the small hi-tech company with a narrow product range. It must earn a sufficient margin from sales of these products to support its entire R&D programme. The position is helped if the product represents some small, but crucially important part of customers' overall purchases. In this situation customers are quite likely to be insensitive to price. And, providing the market remains small, competition is likely to be slow to emerge in these circumstances.

Companies adopting a "niche" strategy must focus their development efforts on achieving high technical performance in their products and frequently on the provision of a high level of after-sales service and maintenance. And marketing must be carefully targetted at the small number of potential buyers.

Sometimes niche markets gain much greater importance over a period of years and competition becomes more intense. Other hard company strategies then become more appropriate.

Product differentiation

The small company seeking to enter a large, established market must adopt a strategy which differentiates its products from competitors right from the start. Product development and marketing must emphasise performance and quality.

Production costs will often be higher than for existing suppliers, so the small company must charge higher prices to achieve adequate profit levels. The technical performance of the product must be good enough to justify this higher price, as well as to counteract the established market position of existing suppliers.

Cost leadership

The "cost leadership" strategy involves securing a sufficient cost and price advantage over competitors to deter or defeat further new entrants. It must usually be supported by efficient, large scale manufacturing operations and a national or worldwide marketing effort aimed at securing a dominant market share.

Cost leadership strategies depend on highly standardised and reliable products, ideally requiring little after-sales support. The approach usually involves substantial investment in production and marketing, and to this extent must be regarded as high risk, and more suited to the more experienced entrepreneur.

The clearest proponents of the strategy are the large Japanese manufacturing companies. By adopting a worldwide perspective to marketing they have been able to justify the huge manufacturing volumes required to launch many new consumer products at prices that largely eliminate competition. However, a few smaller hi-tech companies have adopted this strategy, focussing on product costs at an early stage in development, and subcontracting production to larger companies, in order to reduce the investment required and provide the economies of scale needed to be successful.

Reducing marketing and distribution costs

Setting up the marketing and distribution network for a new product can be both time-consuming and costly. And in many markets a high level of advertising and promotional activity is needed when products are first launched. In devising your start-up strategy you should look at ways of reducing these costs. In

doing so, you will usually make the business easier to manage and more attractive from the financier's point of view.

In the consumer field, mail order advertising is an important way of reducing marketing costs, and eliminating the need for a sales force altogether. And it is possible to subcontract virtually your entire distribution operation. In other sectors, too, you have the choice between using your own sales force or selling through distributors or dealers.

Another important way of reducing the marketing effort needed is to sell to OEM's rather than direct to end users.

Selling to OEMs

Many small hi-tech companies depend for their sales on larger companies, whose business it is to assemble components into finished products, for purchase by end-users. Prime examples of "OEM customers" are the suppliers of turnkey computer systems for computer aided design. Such systems typically consist of a combination of different pieces of hardware and software from a variety of sources, all linked together through a purpose designed operating system.

When a company is first deciding its business strategy, there is often a choice between selling through OEMs or direct to end-users. This may affect the design, the selection of the product itself and the cost of R&D. It is essential to understand the advantages and disadvantages of each approach, and decide on which route is to be adopted before starting product development.

Advantages

Selling to OEM customers offers a number of important benefits. It means that much of your selling is done for you, and the size and complexity of your marketing and customer service operations can be greatly reduced. This in turn makes it easier for you to manage the business – only limited marketing skills are required. And of course you immediately gain the backing and reputation of the larger OEM in the market-place.

So two or three good OEM customers can grant your small company immediate access to volume markets. Once the OEM has "designed-in" the product, it is largely dependent on it. And a continued flow of sales is likely to be generated with relatively little marketing effort on your part.

Disadvantages

There are a number of disadvantages to marketing through OEMs.

Time and effort

A great deal of time and effort may need to be put into obtaining each OEM contract in the first place. Negotiations can take several months, and you may have to make design modifications, preventing development work aimed at a more general market. And you must continue to devote a great deal of effort to supporting your OEM customers technically. An OEM's reputation is only as good as the weakest component in its product. So it will expect the highest standards of quality in what it purchases.

Loss of independence

OEM customers may expect to have a big say in your product development programme. They will probably press you to put effort into upgrading the items they use. And they will expect to have advance warning of design changes so that they can make the necessary alterations to their own product. They will also demand lower prices than end users to reflect the marketing costs that they save you.

Loss of proprietary information

OEM customers often ask for proprietary information on their subcontractors' products. They need this to be assured of quality and performance, and to be able to provide service back-up to end users. This is clearly an important disadvantage to companies anxious to protect their technical secrets. Some safeguards can be provided by building a limitation on access to this information into contracts.

But the commercial benefits of OEM contracts should always be weighed up carefully against any loss of proprietary information that this entails.

Loss of access to users

Perhaps one of the most important disadvantages of selling through OEMs is the loss of direct contact with end-users. These are a primary source of ideas for new products and innovations, and without this contact, R&D effort can be insufficiently focussed on key user requirements. It is important to find ways around this limitation if long term product competitiveness is to be assured.

Loss of marketing freedom

For example, there may be pressure to delay the announcement of product improvements until OEM customers have had the chance to incorporate them into their own offerings.

The OEM relationship is one of strong interdependence between customer and supplier. By concentrating your sales on a handful of OEM customers, you are inevitably highly dependent on the success of their products, and on their own marketing activities. And you are vulnerable also to the loss of any one customer, should they decide to use an alternative supplier or establish an in-house capability.

Greater size, together with proximity to the market, usually gives the OEM the upper hand in negotiations. And margins, terms of trade and R&D strategy are all susceptible to pressure, as the relationship becomes established. This can eventually lead to pressure to purchase your business, especially if you are limited to a single OEM customer. So make sure you are dealing with a portfolio of OEM customers and avoid these pressures becoming too severe. You should be alive also to the potential difficulties of coming out from behind your OEM and marketing direct to end users. Conflicts of interest with your OEM customers may necessitate developing an entirely new product or entering a different sort of market.

Despite these potential long-term disadvantages, the OEM route is invaluable for breaking into large markets rapidly. But you should consider the strategic implications for your business carefully before embarking on this course, and you should seek the advice of a solicitor before any contract is prepared.

Distribution companies

Marketing in hi-tech distribution companies bears many similarities to more traditional distribution. Both the products handled by the distributor and the services offered must be promoted.

As a business, distribution tends to be very cost competitive and this gives an automatic advantage to the large, established company. The new start-up must therefore adopt a market entry strategy which is based on:

- efficient operations;
- a professional approach to selling, with a high level of service and product knowledge;
- high quality agreements with suppliers, preferably with sole UK distribution rights.

The main additional feature of high technology distribution companies is the degree of technical knowledge that is often required of staff, and the need to keep up to date with technical developments in the market. This is especially important where you are distributing components or assemblies to OEMs, perhaps on behalf of an overseas manufacturer, and providing design advice on how they can be used.

As far as value added distributors are concerned, marketing requirements are much closer to those of the conventional product company. But there is often scope for joint marketing activities and you should ensure that you take maximum advantage of these. Rather like the OEM relationship, there is strong interdependence between manufacturer and distributor, and you must ensure that you get advance warning of product and price changes. At the same time, the confidence which your suppliers have in your business, and in your product, will be reflected in the marketing support they provide.

Chapter V – Start-up costs and financing

For the scientist or engineer thinking of starting a new business, the amount and form of finance required, and the likelihood of obtaining it, have an important bearing on the type of strategy to adopt. Another important factor is the time and effort that must be put in to obtaining finance whilst still working for someone else. This can be a lengthy and time-consuming exercise, and for many people this alone is a deterrent to starting their own business.

Sources of finance

Exhibit 4 showed typical cash flow profiles for hard and soft start-ups. The amount and type of finance required depends on the depth and shape of the financing loop, on the security available, and on the risks and returns involved. In looking at any proposal, the financier's job is to examine these different factors and, if the project meets the investment or lending criteria, to provide a package which is appropriate to the company's needs.

There are five main sources of finance available to the hi-tech start up:

- your own capital (or capital from friends or relatives);
- bank loans and overdrafts;
- venture capital;
- government assistance;
- suppliers and customers.

Personal capital

Both banks and venture capital institutions will expect to see some form of personal investment in the new company – sufficient to ensure a continuing high level of management commitment. But they will also put a realistic limitation on that investment. They are no more interested in the possibility of your losing your shirt than you are.

Bank finance

Banks normally only lend money on a secured basis. This is necessary because the margins on which they lend do not allow for losses on business failure. Buildings and equipment, inventory, personal securities and/or guarantees of principals can all be used as collateral in the right circumstances. But the prime security that they will be looking for is debtors arising from successful sales.

For many hi-tech companies, bank lending is the principal source of external finance, certainly during the start-up and early growth phases. It is important to keep your bank manager closely informed of future developments in your businesses so that the growth in lending facilities can be planned ahead.

Venture capital

The role of venture capitalists is to provide risk capital, or "equity". Rather than the banker's interest income, they anticipate high capital gains on a proportion of the companies in which they invest and recognise that they are likely to incur failures in return. Most expect to sell their shareholding within five to seven years. In practice, venture capitalists often structure their investments to include a mixture of debt and equity, but this need not concern us here.

Venture capitalists tend to specialise in particular industries and in particular types of company. Most have upper and lower limits to the amount of money they will invest. Some are mainly interested in investing as members of a syndicate, led by other funds.

Government assistance

There is now a wide range of Government grants and incentives to help industry. Some grants are only available in particular geographic areas. And there is a specially designed package of incentives available for R&D based companies, although this is subject to change from time to time.

In each case you will need to satisfy a number of specific criteria to qualify for assistance, and in most cases you must not have already started the project. Applications can take several months to process, so you need to apply well in advance. You should be very wary of relying on grants for financing the start-up stage of your business. They are perhaps of rather more value when your business is up and running and you want to expand or develop your activities in some way. Then you are more likely to qualify for assistance and it is usually easier to make your application well in advance of the planned project start date.

A number of financial institutions have agreed to make use of the information used by Government to assess projects under the Joint Appraisal Scheme. Using this can help speed up the process of obtaining finance.

Finance is also available from a variety of national and local government funded agencies. It is always worth considering with your accountant or local Enterprise Agency what might be available in your area.

Customers and suppliers

One of the principal financing needs of soft companies when they first start trading is working capital to cover costs until payments begin to come in. Persuading customers to pay for work in advance or to make stage payments, can greatly reduce the amount required from outside.

A similar principle applies to distribution and product manufacturing companies. The terms of trade you negotiate with your suppliers can have a significant bearing on other financing needs.

Where you have specialist skills or products, your suppliers may be more prepared than you would think to help you use their products to penetrate new markets. So do not underestimate your negotiating power.

Hard company financing

By their very nature, hard companies tend to require much more start-up capital than soft companies. And the investment is also more risky. You must expect to use nearly all of this money before any income is received from customers. Further outside finance will probably be needed to fund expansion if you are successful.

So hard start-ups require large amounts of 'risk' capital from venture capitalists or other sources. And the company's backers will want a share of the ownership of the company (of the 'equity') in exchange – typically between 15 and 40 per cent.

Not surprisingly, financiers usually want to see a detailed business plan before agreeing to provide capital on this scale. And they will want to be assured of the management team's abilities.

They will want to monitor your business closely once they have made their investment, and they may well insist on representation on the board. If things are going badly, they may use their position to negotiate management changes.

An experienced venture capitalist can provide an invaluable source of support and advice to the new company, although some people find the reduction in their control of the business a deterrent to seeking outside funds in this way.

There has been a proliferation of venture capital businesses in the UK over the last five years. But despite this, venture capital funds only back a very small proportion of the proposals they see. One of Britain's largest funds receives some three or four hundred approaches a year, but only invests in six or seven.

Preparing the business plan and negotiating with venture capitalists can be a time-consuming exercise. This alone may be reason enough to prefer a softer form of start-up.

Soft company financing

It is often possible to start a "soft" business without recourse to venture capital. The amounts involved are more likely to be within the reach of personal savings or normal bank lending. So the formalities involved in obtaining finance are relatively undemanding. You will still need to prepare a business plan, although this will not normally need to be as detailed as for venture capital funding. In addition, many soft company start-ups find it possible to secure favourable contract terms with customers, often with some cash in advance.

Many of those interviewed in preparing this booklet started business in this way. Some have already built up large and highly successful enterprises, often going through a "hardening" process en route.

There are three things to remember if you want to keep start-up costs down:

- keep your investment in equipment and your overhead costs to a minimum;
- try to get contracts with customers signed as soon as possible after you start business;
- persuade your customers to provide early stage payments, if possible with some money in advance.

Some people start soft businesses in a more ambitious way, using venture capital to establish a sizeable operation in advance of

contracts coming through. But it is often possible to avoid this kind of initial commitment.

Once obtained, contracts with customers create debtors against which banks may be prepared to make further lendings. This can be used to finance the working capital which the growing business needs.

Distribution company financing

The costs of starting hi-tech distribution companies vary significantly. However, in many cases, the scale of operation required to start trading is quite limited. Personal savings and bank overdraft facilities may be sufficient in this case. And, like contract R&D, it may be possible to obtain favourable credit terms from suppliers.

Flexing the terms of trade in this way can have a big impact on your working capital requirements, although to an extent this is at the cost of increased financial exposure, which underlines the importance of tight financial control.

Distribution companies are particularly prone to what is called 'overtrading' – an inability to generate cash sufficiently rapidly to finance growth, even though the business may be making good profits. Injections of outside equity capital may be necessary if growth is very rapid.

Financing transitional strategies

From time to time soft companies identify opportunities to develop new products – "to go hard". The opportunity usually arises out of work undertaken for individual customers; it is technically driven. The same applies to hi-tech distribution companies, where good product ideas are likely to emerge from knowledge of unmet needs; they are market driven.

Both these routes into products have some useful advantages. One of the main benefits is that some, or all of the product development can be financed out of internally generated cash flow. And if you do run into development problems it may be possible to defer completion of the project, providing the difficulties are recognised in time. This is especially true where

niche markets are involved, as the costs of market entry do not escalate so rapidly as in other areas. Another approach is to finance initial product development, perhaps to prototype stage, out of internally generated cash flow, and seek outside venture capital to complete development, and take the product to market. The pros and cons are discussed in detail in the booklet on *Strategies for Growth in High Technology Companies*.

If you are thinking of starting a business with the intention of making a transition into products later, make sure you plan for it systematically – for example, be ready to recruit new staff with different management or technical skills.

Your bank will normally expect to see the full costs of developing and marketing your product covered by equity finance or by profits on existing activities, rather than through overdrafts. And new products are rarely developed entirely according to plan, so some financial contingency is essential. Banks have very little flexibility to increase their lending to overcome development overruns or other unforeseen difficulties. And if a company does get into financial difficulties in this way, there is often insufficient time to introduce outside equity capital. So make sure you are not going to overstretch your finances during the course of the transition. And watch the balance between bread and butter businesses and speculative development work. Check also that you can continue to finance any growth in your existing businesses. This requires tight planning. And if you are in any doubt about your company's ability to finance product development internally, you would be better off seeking an outside equity investment right from the start.

Chapter VI – A systematic approach to starting a new hi-tech business

The people who start new hi-tech businesses are usually in secure employment, with highly marketable skills. The decision to 'go-it alone' is one of the most difficult decisions facing anyone. It affects both the individuals and their families, and there is a great deal to be done between taking that decision and making it a reality.

The purpose of this chapter is to set down the steps involved, in *either* starting a business from scratch, *or* making the transition from part-time to full-time. The aim is to make it easier for you to evaluate the options and work out how to go about it in a well-planned and systematic manner.

Step 1 – Identify what you are good at

When major hi-tech businesses draw up their strategic plans, they look closely at market opportunities – at which new markets are growing most rapidly; at which technologies are likely to be the most significant in five or ten years time. They can afford to buy into new business sectors, by recruiting specialists, investing in R & D, or acquiring whole companies. If they lack a certain technical or management capability, they can acquire it.

As an individual entrepreneur you have only one resource – your own skills and experience – together with those of your co-founders. Your first task must be to assess your own strengths and weaknesses realistically, and identify what you can contribute to the new venture.

Each founder should draw up a list of personal strengths, weaknesses and areas of inexperience under the following headings:

- technical expertise
  - do you have any special skills or knowledge for which there is a strong market?
- market knowledge
  - what markets do you *really* understand?
- management skills
  - how experienced are you in the different aspects of running a business (project management, marketing, production, business planning, finance and general management)?

- business contacts
  - can you identify potential customers or business partners with whom you can discuss ideas, or who might give you contracts?
- product opportunities
  - do you have firm ideas for new products or services, based on a clear understanding of market needs?

You will find it helpful to write detailed notes as you go through this process. Besides assisting you to clarify your own thoughts, it will help you to discuss plans with others later on.

Step 2 – Decide what type of business activity to pursue

The analysis you have carried out of your strengths and weaknesses will help you decide what type of business you are most likely to succeed at. In doing so you need to pay careful attention to the risks and management difficulties of different sorts of business activity.

In deciding what sort of business you want to start, and in working out how to go about it, you should examine all of the options which are open to you. You should analyse how well equipped you are to run different types of business. And you should consider carefully whether each strategy is likely to meet your personal, financial and career objectives. Will the relatively slow rate of growth achievable in soft companies meet your financial objectives? Are you and your family prepared to make the enormous personal commitment of time which hard start-ups demand?

You should look, not just at the next two years, but at five or ten years into the future. Do you want to develop with the business and move progressively into pure business management? Do you want to remain in R&D or marketing? Will you be happy in a large and growing organisation, or are you primarily attracted by the small company environment? Or do you simply want to exploit a particular idea?

And you should think also about the future of the markets in which you will be operating. How quickly will they grow? Who will be your main competitors in five years time? And what will all this mean for the way your business must be run?

There are two fundamental decisions on which each member of the founding team must agree:—

- The key technology, skills or knowledge on which the business will be based.
- Whether the business will be engaged initially in consultancy, contract R & D, speculative product development or distribution.

Do you have in mind using one form of start up as a route into another activity? (e.g. from distribution into manufacture or from consultancy into contract R&D). If so, you should clarify how you expect this to be achieved and how long it will take.

Above all, you must be happy that the style of business you want to build fits with you as individuals, and that you have the will to develop with it as it grows.

Step 3 – Define the key characteristics of the product or service

The next step is to define in as much detail as possible the product or service you are proposing to sell. The questions listed below are of fundamental importance and you should ensure that you have a well thought out answer to each:

- What precisely is the product or service?
- Who precisely will buy it?
- How will purchasers use your product or service?
- What needs will it meet?
- How are those needs currently met?
- What advantages will your product/service offer over competitors?
- What is the nature of the purchase decision?
  - who makes the decision and how?
  - will your product be bought or used in conjunction with other products?
  - how will your product be evaluated against competitors and what characteristics will be regarded as most important?
  - how long will purchasers take before placing orders?
- How should the product or service be priced?
- How should the product be marketed and distributed?

- In which geographic markets will your business operate and how?
- What form of after-sales support is required and how will it be provided?

This exercise can be time-consuming, especially for the hard start-up, where products must be specified in great detail. This alone may be reason enough for you to prefer a softer form of start-up strategy.

You will probably find it useful to consult potential customers or distributors in making this analysis, although conflicts of interest with your present employment may not permit this.

Step 4 – Write your business plan

The start-up business plan has two purposes. Primarily it is a framework for the strategic development of the business and a basis for monitoring performance against goals and objectives. But it also serves as a document with which to seek financial backing.

Whatever form of finance you require, before agreeing to make funds available, financiers will want to be assured:

- that the market opportunity exists;
- that you have the capability to exploit it;
- that the business meets their own particular investment or lending criteria.

Demonstrating that you have adopted a realistic and systematic approach to planning will help convince them that you have the management ability to make the business a success. They will be looking for depth in your thinking, therefore. And they will want to be sure that you have developed some contingency plans for when things go wrong.

The structure of a typical hi-tech start-up business plan is shown in Appendix 1. The plan should include a set of financial projections showing the amount, type (equity or loan), and timing of any injection of outside capital. And it should include a detailed timetable, with key milestones against which progress can be measured. This is especially important for hard start-ups, where the product development programme must be closely co-ordinated with the build up of production facilities and marketing

networks. So the timetable should cover every aspect of the business – R&D, facilities, staff, production and marketing. This will provide the basis for detailed project planning and control once the business gets underway.

The circulation of business plans or other documents seeking investment is controlled by Government legislation. So you should seek professional advice before distributing it.

The length of the business plan depends on the type of business you intend to set up. A venture capitalist will probably expect to see a plan 50 pages long for a hard start-up seeking a million pounds or more. On the other hand, a ten page plan will probably be adequate for the entrepreneur who wants a 50,000 pound bank loan.

Whatever the length, a one page executive summary is essential to highlight the key points – what the project is about, who is involved and how much money is sought.

You should resist the temptation to use consultants or accountants to write the business plan for you, even if you can afford to do so. They can often give you useful advice in structuring your plan. They may be able to help provide factual or market research information and check your financial projections. You can also use them as a sounding board – to asses your proposition as if they were the bank or venture capitalist. But ultimately it is your plan and your money that is at risk; and responsibility for the content must rest with you.

You do not need to adopt an expensive form of presentation for the plan, but you should ensure that the reader can find his way around it easily. A contents table, clearly headed diagrams and tables and a well organised structure can all help here. Detailed information should be relegated to the appendices.

If you can, you should seek the advice of an entrepreneur who has founded a similar sort of business. Practical hints from someone who has experienced the problems and succeeded are the best sort of advice you can get.

In preparing your plan, you should pay particular attention to marketing and distribution channels. This is one of the principal failings of new hi-tech companies. It is particularly important for 'hard' companies, where a misconceived product or marketing

strategy may only become apparent 18 months into the project, by which time it may be too late to change the design. And however good your product is technically, it will not sell itself. People will only buy your product if they are made aware of what it does, and are convinced of the benefits it will bring them.

You must expect your first offerings to be rapidly superseded by those of competitors. Your business plan must therefore identify follow-up products, and you must ensure that development work is put in hand in time to replace lost income as initial products become obsolete.

Appendix 2 provides a checklist of some of the key questions on products and markets to help you draw up your business plan.

Step 5 – Use your business plan to raise finance

Chapter V described the different forms of finance available to start up companies. An accountant with experience of raising finance for new ventures can advise you on whom to approach and may be able to give you some introductions. And your bank may also be able to suggest venture capital investors worth approaching. Venture capitalists receive far more applications than they can investigate in depth. And by no means all are prepared to consider start ups. So referrals from accountants, solicitors and bankers, or from industry colleagues, help them focus on the more promising investment prospects.

Having decided which financial institutions are most likely to be interested in your business proposal, your next step should be to contact them formally – either by telephone, or by writing a short letter enclosing your executive summary. You will probably already have discussed the proposal informally with your bank manager.

You will find it useful to prepare a brief oral presentation describing your proposal. This should cover:

- the products or services you propose to sell;
- the market and your particular success ingredient;
- the company's growth prospects;
- the key steps which you propose to take to achieve your objectives;
- key managers and their backgrounds;

— the amount of financing you require and the way in which you will use it.

You must expect to be questioned in detail on your plans. It helps to prepare for this in advance.

You should also use the opportunity to assess the financier's management team. So at your first meeting, do not hesitate to ask about their investment or lending philosophies, and about how much practical help they can give your business.

This particularly applies to venture capital investors, where there are a wide range of different practices:

— Will they be active or passive investors?
— Will they lead a syndicate of other investors?
— How often will they require reports?
— Are they going to be around in two or three years time to provide finance for growth if you need it?
— Most important, will you be happy to work with them as individuals? If one venture capital fund is prepared to invest in your company, there are usually others who will also.

You should also ask to meet the principals of some of the companies in which they have already invested.

Bankers do not generally investigate proposals in as much detail as venture capitalists. This is because their finance is secured; though banks also call for independent market and technical assessments in some cases. But your bank will want to be assured of your ability to make the venture a success and you can expect a very similar line of questioning.

Many bankers have wide experience of new businesses and can give you a great deal of practical help and advice.

Step 6 – The formalities

Before starting to trade, there are a number of legal and other formalities which you need to go through. There are also certain actions which you would be well advised to take to protect your own interests.

There are no special steps that need to be taken for hi-tech businesses and the reader is referred to one of the many good

books on setting up a business for detailed information. This booklet merely highlights some of the key items:

Trading entity

You can set up you business as a sole trader, partnership, or company, or as a branch of an overseas company. A sole trader is the simplest way to start business, but setting up a limited company is also very straight-forward and inexpensive.

Your accountant or solicitor can advise on the advantages and disadvantages of different trading vehicles for your business. But it is unlikely that a venture capitalist will back anything other than a limited liability company.

Location and premises

People setting up new businesses generally choose to do so close to their homes. There are great advantages to be drawn from remaining close to people and organisations that you know well. And moving house adds to the existing complications of starting a new business. However, you should also bear in mind that there are substantial Government incentives available for businesses moving to the Assisted Areas. Many local authorities also offer incentives such as rent free periods on premises. Some have developed incubator or workshop units for new businesses, with access to shared services like photocopying.

It is always worth looking around before finally deciding. But remember the first few years of your business are likely to be highly uncertain. So you should avoid expensive premises or entering into long term commitments. On the other hand, you should also try to get premises which provide scope for growth (by expansion, or by enabling you to move easily to a nearby site).

Employing staff

Various advisory booklets on this subject are available from the Department of Employment and your solicitor can provide detailed help. Remember that the skills of your staff are likely to be in great demand nationally. As well as meeting the legal requirements, you must also ensure that their motivation continues at a high level as the business grows. You should consider at an early stage what form of "golden handcuffs" (share options, profit sharing schemes etc.) you are going to adopt to retain key staff.

Intellectual property

You may be able to protect your products from unwanted competition by using patents, trademarks and copyrights.

You should consult a solicitor for further advice on this at the earliest opportunity. However, your most valuable intellectual property may well be the knowledge of your staff. So make sure that they don't give important information away to people outside the business, and that they are motivated to stay with you.. If they do go, check that their work is fully documented and they don't take their knowledge with them.

Pensions and employee benefits

Your accountants can advise on tax efficient pension schemes and employee benefits.

VAT, PAYE, National Insurance

You will need to maintain certain records to comply with Customs and Excise, Inland Revenue and with the Department of Health and Social Security regulations. Your accountants can help you devise simple systems to meet their requirements.

Help with the day-to-day running of the business

When you first start trading, you may need outside or part-time assistance with bookkeeping and preparing the payroll. Most firms of accountants will provide these services, or help you set up the records in such a way that you can rely on part-time help. They will also prepare whatever management accounts and financial statements you need for your business.

Step 7 – Set up your systems and procedures

The extent of the formal systems that you require will depend on the size and type of business that you set up. They must also reflect how rapidly you intend to grow.

As a minimum you will need financial systems which will:

- provide you with regular financial information upon which to base your business decisions;
- protect your assets by reducing the possibility of errors and fraud by staff;
- ensure compliance with all relevant statutory requirements.

They must also be able to cope with any planned expansion or diversification in the business.

If you are operating as a limited company you will be required by statute to maintain records:

- of all moneys received and paid out by the company;
- of the assets and liabilities of the company;
- of stock held by the company at the end of each financial year, together with details of all goods purchased and sold.

In practice you would be well advised to keep records to meet these minimum requirements whether or not you operate as a limited company. Your accountant will be able to advise you on the most suitable accounting systems.

In order to monitor the performance of the business, regular management accounts should be prepared, which enable you to compare performance against budgets. These should normally consist of:

- profit and loss accounts;
- balance sheet;
- cashflow statement;
- key performance indicators.

The frequency of preparation will depend on the nature of the business, but for hi-tech companies it is usually necessary to prepare the management accounts on a monthly basis.

As an R&D based company you should also set up proper systems for project management and control. This inevitably involves some form of time reporting so that you can monitor progress against development budgets.

You also need to agree arrangements for the routine management of the business:

- How policy decisions are to be made and recorded;
- Authority levels for the purchase of equipment;
- Recruitment procedures;
- Administrative responsibilities.

As businesses grow, increasing formalisation needs to be introduced into how they are managed. So, it is a good idea to start

on a proper footing by making some basic agreements between the members of the management team on how the business is to be run. The arrangements can then be modified or added to as the business develops.

Chapter VII – Postscript

Anyone leaving secure employment to start a new business takes a big risk. This booklet was compiled after a programme of interviews with the founders and senior management of firms who had taken that risk and succeeded. It drew also on Barclays Bank's own analysis of hi-tech companies.

Whilst there is no panacea for success, there are some important lessons to be learned from these studies.

Organisation and management

Commitment

Starting a new business requires a strong commitment of time and effort. You must act as the "product champion" for your ideas and for your business. This means being able to convince your backers, your staff and your customers that you will be successful. The best way to start is by genuinely convincing yourself.

Complementary management skills

In the US, the five golden rules for the success of any venture capital backed company are often quoted as "management, management, management, product and finance"*. Few individuals have all the skills needed to run a fast growing business. In putting together your management team, you should ensure that they have complementary skills to your own.

Planning

Effective business planning is one of the best ways of reducing risk. You need to update your business plan regularly at least every twelve months as the business develops. And you must have a clear view of how you want your business to develop long term, and of the role that you wish to play in it.

Strategy

Matching founders' skills

Different types of business need different management skills. Make sure you understand what your strategy involves and do not be tempted to start a business unless you have, or can acquire, the skills it needs.

*The three 'managements' in fact refer to 'management-champion', 'management-team' and 'management-skills'.

Understanding your market

The first step in drawing up any marketing strategy is to understand the users' needs, so that your product or service can be designed to meet them. But you must also understand how they will actually make the purchase decision – what factors will be involved and how long it will take. And make sure you have established, right at the start of the project, how your product is to be sold and distributed. This can have a profound influence on the development and marketing programme.

Special competitive advantages

Above all, the products or services offered by the small company must have distinct, and unique advantages over competitors, with features which will persuade customers away from apparently safer suppliers.

Finance

Room for manoeuvre

Businesses often get into difficulty because their financing structure is not appropriate to their activities, and because they allow insufficient room for manoeuvre. Hi-tech companies almost invariably experience some delays – in product development, or in orders coming through. Ensure you have some financial slack to cope with these delays.

Financial controls

Financial controls need not be complex when a business is small, but they must be adequate to enable you to manage the business. Make sure you establish "good financial habits" early.

Persistence

There is an element of luck in any business venture. But the luck you get can be affected by the effort you put in. Starting a hi-tech company is very hard work. Rapid growth often only comes to a hi-tech business several years after it has been established. During this period you have the time to learn some of the basic skills of managing a company, ready to seize major opportunities as they arise. You are then in a much better position to cope with the quite new set of problems which success and rapid growth bring with them.

APPENDIX I

Contents of a hi-tech start-up business plan for use in raising finance

Executive summary

Purpose of document
Product(s)/service(s) to be offered
Market prospects
Founders' backgrounds
Summary of financial projections
Funding required and how it will be spent
Contact for further information

Introduction

Objectives
Background to proposal
Contributors to the business plan and information used
Retrictions on scope of responsibilities

Products(s)/services(s)

General description
Design characteristics and features
Circumstances of use by purchasers
Advantages over competitor products (current and future)
Research and development (current status and work to be undertaken)
Patents, licences and other intellectual property rights
Future development plans, including follow up products

The market

Market size and trends
Market segments
Seasonality of orders/other special factors
Prospective customers and their needs
Nature of the purchase decision
Dependence on third parties

Competition

Principal competitors and their products (including overseas competitors)
How competitor products are used
Market shares
Pricing, and marketing strategies
Methods of selling and distribution
Development plans

Possible future entrants
Strengths and weaknesses
Likely reaction to your product

Marketing

Positioning
Pricing and method of payment
Promotion and advertising
Distribution
Selling
Export Sales
Customer support
Key contracts or customers anticipated

Production

Location
Facilities
Workforce
Sourcing and subcontracting

Management and staff

Organisation structure and responsibilities
Summaries of career experience and track records of key executives
Recruitments planned with timetables
Employment terms for key personnel
Other employees:
– number
– qualifications and skills
– training
– proposed terms of employment

Buildings and equipment

Items required and location
Costs
Useful life
Whether to be purchased, rented or leased

Project phasing

Timetable for key activities and decisions
Resourcing for key activities
Major milestones

Key issues

Principal risks and problems
Proposals for meeting these

Financial projections

Five-year forecast profit and loss accounts:
– Years 1 and 2, monthly
– Years 3, 4 and 5, quarterly
Five-year cash flow projections:
– Years 1 and 2, monthly
– Years 3, 4 and 5, quarterly
Five-year pro-forma balance sheets:
– Years 1 and 2, quarterly
– Years 3, 4 and 5, annually
Peak funding requirement
Key assumptions used in preparing forecasts
Sensitivity to changes in key assumptions
Break-even analysis

Funding

Amount of funding request
Promoters' equity
Other sources of funds:
– Bank
– Grants
– European funds
Availability of security
Exit route for investors (if appropriate)

Appendices

Technical reports
Market surveys
Additional detailed information

APPENDIX II

Checklist of key questions on products and markets

The product opportunity

(a) What is the potential product/service?
(b) What does it do for consumers/users?
(c) What needs will be satisfied?
(d) How are those needs currently met?
(e) What are the advantages over competitor products/services?
(f) What price does the market require?

Stage of development

(a) What stage of development has the product reached?
(b) How much further work is required?
(c) What are the key development objectives and milestones?
(d) Is there an action plan for meeting them?
  — individual tasks
  — people allocated
  — target completion dates
(e) Have the possible benefits of other avenues of product development been considered?
  — joint development with prospective customers
  — contract development
(f) Have all government grants been applied for?

Technology

(a) Does all the technology currently exist?
(b) Who else has the technology to satisfy the identified needs?
(c) What could be the effects of other technologies under development?
(d) Can any of the technology be bought in?
(e) How fast is technology in this area changing?
(f) What technologies are competitors using?
(g) What measures have been taken for technology protection?
  — secrecy measures
  — patents
  — copyright
(h) How comprehensive is the protection?

Product evolution

(a) Is the start-up dependent on the success of one product?
(b) Are there plans for product evolution or new product developments?

(c) What other needs could be satisfied by the technology?
(d) What modifications are required to meet different end user types?
(e) What is the likely life of the product?
(f) What other applications might there be for the same product?

Manufacturing and operations

(a) How important to the success of the business is tight control of the manufacturing process?
(b) Could all or part of manufacturing be sub-contracted?
(c) Will manufacture be through batch production, jobbing shop, or mass production?
(d) What is the target manufacturing cost and can it be achieved?
(e) How much manufacturing space is required?
(f) What manpower is required? Are special skills needed?
(g) What type of capital equipment is required and how much does it cost?
(i) Are there contingencies for different levels of output?
(j) Are there any critical processes still to be developed?
(k) Do any parts require long lead times?
(l) Are any parts supplied from a single source?

Market analysis

(a) What, in practice, is the real "opportunity"?
(b) What are the existing products on the market and who are the competitors?
(c) Do they fall short of customer requirements in any way?
  — performance
  — quality
  — price
  — service
  — location
  — size
(d) Is detailed historical market analysis possible and what does it show?
(e) What market research has been conducted and what does it cover?
  — market size
  — growth potential

- constraints on growth
- achievable market share
- product life-times
- future developments

(f) What is the potential customer profile and has detailed information been gathered?
- total number of potential customers
- volume/value of available business
- individual potential customers
- customer needs/preferences
- level of knowledge

(g) Which customer types and distribution arrangements does the company propose to adopt?
- end user
- OEM
- distributor
- agent

(h) What factors influence the purchase decision?
- compatibility with other products
- reliability
- ease of use
- ease of maintenance
- documentation
- price

(i) How is the purchase decision made?
- one-off or repeat purchase
- short or long lead time
- many or few decision-makers
- board approval required
- specification trials required

Pricing

(a) At what price will the product/service be sold?

(b) What is the value of the product to the user; and to different types of user?

(c) What is the pricing strategy?
- short term profit maximisation
- obtain/increase market share
- expand the market
- deter competition

(d) How will the customer pay?
- advance/staged/post payment
- contract terms and conditions

Advertising and promotion

(a) Is there a plan for advertising and promotion?

(b) How will promotional material:
- explain the benefits
- focus on the decision-maker
- avoid claims which cannot be substantiated?

(c) How is the advertising and PR budget to be subdivided?
- literature
- seminars
- exhibitions
- direct mail
- media advertising
- public relations

Sales and distribution

(a) How will the product be sold?

(b) How will you approach agents/distributors/OEM's or end users?

(c) Do you have existing sales contacts?

(d) What terms will distributors expect and what are they getting from competitors?

(e) Will the start up have its own sales force and if so:
- how many sales people will be required?
- how long will it take to obtain orders?
- what skills and back-up will they require?
- where will they be located?

(f) How do you plan to penetrate overseas markets?
- geographic targets
- management responsibilities
- distribution methods/collaborative arrangements
- timetable.

APPENDIX III

Useful reference books

1. Managing High Technology Companies, Henry E. Riggs, Lifetime Learning Publications, Belmont, California 1983.
2. Raising Venture Capital, Financial Times Business Information, February 1984.
3. Starting a Business, Richard Hargreaves, Heinemann 1983.
4. Croner's Reference Book for the Self Employed and Smaller Business, Croner Publications Ltd.

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