High-tech Turnaround
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High-tech Turnaround

Restoring value to underperforming technology businesses

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This book has been written by managers for managers who need to fix problems in high-tech companies that have reached a crisis point. It will also be useful for investors in and advisers to such companies, especially if they need to evaluate, change and encourage management in order to see a turnaround. This briefing is based primarily on practical experience of actually managing high-tech turnarounds, and also on research into what makes a successful high-tech turnaround. Both the experience and research range from the very large high-tech firms, such as the world’s biggest ever high-tech turnaround, IBM, in the mid 1990s, to smaller high-tech firms.

High-tech firms are fragile. The young high-tech firm has few resources other than the capabilities and commitment of its founder or founding team; the established high-tech firm lives with the constant threat of devastation from some new technology brought to market quickly and effectively by a start-up. The success of the high-tech firm is critically dependent on developing a product-market in which the firm can provide superior customer satisfaction. The firm, whether a new start-up or a more established high-growth operation, can reduce the inherent risk involved by avoiding certain product-market options, by having a management team which combines strong technical expertise with total commitment and by avoiding six typical start-up problems when it develops new products. However, choosing product-market options which reduce fragility, and hence risk, may also reduce the growth potential of the business.

While the firm is growing successfully it is able to add layers of resource to its initial fragile base. Retained earnings increase the capital base and may improve debt capacity. As more management and staff are added, the firm’s competence base increases. Market credibility improves and competitive advantages become embedded in the organization. A high-performing culture may have developed which also increases the chances of subsequent success. However, the extent to which fragility can be reduced is limited due to the inherent characteristics of some of the forces driving fragility. The characteristics of the entrepreneur and those of the technical employees mean that the high-tech firm continues to be fragile.

Inevitably a crisis hits nearly all high-tech firms at some stage. Knowing what strategies and actions are necessary to get out of crisis is crucial to a successful turnaround. Even a single problem can cause a major crisis very quickly, unlike the situation in non-high-tech firms where several factors usually need to be present simultaneously for a crisis to develop. The high propensity for crises among growing high-tech firms is matched, however, by an ability to stage a rapid sales-led recovery when the current conditions are right – a much faster recovery than is possible in non-high-tech crisis situations.
This book focuses exclusively on high-tech turnarounds. We may touch on tasks and issues common to turnarounds generally, but they are not covered in detail as they have already been covered in Stuart Slatter’s book *Corporate Turnaround* (Penguin, 1999). Thus this book does not cover crisis stabilization and crisis cash management, writing a business plan, or financial restructuring, and the reader is referred to *Corporate Turnaround* for those topics. This book looks at the causes of crisis in high-tech firms, which derive from the fragility of high-tech businesses of all sizes. We start with a review of what makes high-tech different from other kinds of business. This will be useful to any turnaround manager who has been brought into a high-tech firm from another industry, and in our experience of turnarounds even high-tech managers themselves often benefit from understanding what is different about high-tech, not least so that they can communicate key differences to bankers, investors and others who may not have as clear an understanding but whose support will be essential to the success of a turnaround.

Much of management theory necessarily assumes a long history for the industries studied. There is over a century of data on key aspects of products and markets for railways, paper mills, farms and steelworks, which means that they can be valued accurately, the results of many different management approaches can be compared over the long term, and in particular there is a long body of history in managing turnarounds in these industries.

High-tech is different. What is most different is that high-tech products and markets are new; there is little data or precedent compared with other industries. Product-market risk is massive for high-tech companies – what expert at the time would have foreseen that IBM’s outsourcing of a small software project to Microsoft, a company that no one then had ever heard of, would come so close to destroying IBM itself? So this book looks at the high-tech product-market in detail. Changing the product-market mix in some way is usually a key part of a high-tech turnaround, and understanding a firm’s product-market mix is invariably essential to the successful high-tech turnaround.

Next the book covers the problems of growth in the high-tech firm, and then the inevitable crisis. The penultimate chapter sets out recovery strategies for the high-tech firm, and the last chapter covers implementation. This book’s approach to implementation is that it is primarily about people. The people in high-tech firms are different from the people in other businesses, and it is vital in a high-tech turnaround that the manager understand the firm’s people – what is different about them, what this means for managing and motivating high-tech people, and how this affects a turnaround.
Why the high-technology firm is different

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High-tech firms require a different management approach from that commonly used in either large or small firms which are in mature industries and are not technology based. This book explores the strategies and management practices used by the more successful high-tech firms, how high-tech firms get into trouble, and how to turn around an underperforming high-tech business, whether an independent business or a business unit within a larger corporation. We have excluded failed start-ups from our analysis, although they can fail for many of the same reasons as established high-tech firms.

High-tech firms are important to a nation’s economy: many of them are innovators and developers of tomorrow’s industrial technology on which economic progress depends. When these firms grow fast they rapidly become glamour companies and the focus of attention for the press and the business community. However, among the large number of high-tech start-ups every year, very few become fast-growth companies, and even fewer manage to retain fast growth for a sustained period of time. The few that grow fast for a sustained period become household names, such as Dell and Yahoo, although these companies all had hiccups on the way to where they are today.

Each decade sees the birth of new glamour companies. The 1980s saw the birth of Sun Microsystems, Cisco and Compaq. Compaq, which started up in 1982, became the fastest-growing firm in US history, being the first to reach Fortune 500 status in less than four years. After five years, sales revenues exceeded $1 billion, but Compaq was soon overtaken by Conner Peripherals, which exceeded the $1 billion sales level in its fourth year of operation. In the 1990s we saw the birth of Palm (founded in 1992 and since bought by US Robotics/3-Com), Netscape (in 1994, since bought by AOL), Yahoo (in 1994), Amazon and e-Bay (both in 1995), Inktomi (in 1996) and Akamai Technologies (in 1998). Five years after their founding, Amazon and e-Bay had sales revenues of $2.7 billion and $0.4 billion respectively. While these firms receive the media attention, there are an enormous number of high-tech firms which grow at a slower pace or fail to grow at all.

DEFINING THE HIGH-TECH FIRM

There is no single definition of what constitutes a high-technology industry. How advanced does technology have to be before it is classified as high-tech? Answering these questions early in this book is important not only so that the reader can put the many management issues into context but also because the characteristics which describe a firm as being high-tech have a considerable influence over the firm’s strategy and the way in which it is implemented.
The meaning of high-tech

Let us say that high-tech industries are those built on exploiting new scientific advances that have been developed over the past 20 years. They are industries which are growing rather than declining, and above all they are industries where the firms within those industries are using product (or process) technology as a major source of competitive advantage.

High-tech means different things to different people. The commonly used criteria to define high-tech are product or process sophistication, research and development intensity, and the proportion of technical employees within the workforce.

Product or process sophistication

Within business, high-tech is often used to refer to new, sophisticated products or manufacturing processes. The products and processes are often technologically complex and embody innovative advances in product design (product innovation) or in the manufacturing process (process innovation). Although products and processes do not have to be described as leading-edge from a technological point of view to be high-tech, all high-tech industries use technology as a critical source of competitive advantage.

Research and development intensity

Research and development (R&D) expenditure when expressed as a percentage of total industry sales is often used as a criterion for selecting high-tech industries. R&D activity is a reasonable proxy for technologically sophisticated output and is a good selection criterion for industries in the early stages of product development. Industries spending more than 5 per cent of sales revenues on R&D may qualify as high-tech industries using this criterion. However, most firms that regard themselves as high-tech in the US spend double this percentage. The US Semiconductor Industry Association calculates its sector average is 11 per cent. In 1997, the information and electronics sector spent 7 per cent of sales revenues on R&D, although the average of the 500 companies surveyed was 4.2 per cent.¹

Technical employees

Employees with a high degree of technical/professional training play a critical role in high-tech industries. Engineers, computer scientists, life scientists and technicians of various types account for over 10 per cent of the total number of employees in most high-tech industries. Such industries, therefore, tend to have a significant portion of well-educated employees.

No single criterion is adequate by itself to define high-tech since some industries which rank high on one criterion rank low on others. The petroleum refining industry, for example, ranks highly on percentage of technical employees but
relatively low on perceived product sophistication and the R&D intensity scales. Firms which are the subject of this book operate in industries which meet all three of the criteria discussed above. There are ten three-digit standard industrial classification (SIC) codes that meet all three criteria. These are shown in Table 1.1. Due to the broad definition of three- and even some four-digit SIC categories, some product sectors that fall outside these codes will have all the characteristics of high-tech so far described (e.g. some sectors of the medical instruments and photographic industries). Definitions using SIC codes are rarely perfect but give the reader a feel for the types of industries covered under the high-tech banner.

<table>
<thead>
<tr>
<th>SIC code</th>
<th>Title</th>
<th>High-tech employees as percentage of total (1)</th>
<th>R&amp;D as a percentage of sales (2)</th>
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<td>Space Vehicles and Guided Missiles</td>
<td>41.2</td>
<td>12.2*</td>
</tr>
<tr>
<td>357</td>
<td>Office Computing Machines</td>
<td>26.7</td>
<td>11.6</td>
</tr>
<tr>
<td>381</td>
<td>Engineering, Laboratory &amp; Scientific Ins</td>
<td>26.4</td>
<td>5.3*</td>
</tr>
<tr>
<td>366</td>
<td>Communications Equipment</td>
<td>21.9</td>
<td>7.4</td>
</tr>
<tr>
<td>383</td>
<td>Optical Instruments and Lenses</td>
<td>19.8</td>
<td>6.3*</td>
</tr>
<tr>
<td>372</td>
<td>Aircraft and Parts</td>
<td>18.5</td>
<td>12.2*</td>
</tr>
<tr>
<td>283</td>
<td>Drugs</td>
<td>17.7</td>
<td>6.3</td>
</tr>
<tr>
<td>382</td>
<td>Measuring and Control Instruments</td>
<td>14.1</td>
<td>5.3*</td>
</tr>
<tr>
<td>367</td>
<td>Electronic Components and Assembly</td>
<td>12.8</td>
<td>7.4</td>
</tr>
<tr>
<td>737</td>
<td>Computer Programming Services</td>
<td>n/a</td>
<td>n/a</td>
</tr>
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</table>

(1) High-tech employees include engineers, computer scientists, scientists and mathematicians; data is for 1980.

(2) 1979 data; *asterisks indicate that percentages are averages of more than one three-digit code.

Comment: The Markusen et al. data remains the most recently available that covers such a wide sample at the time of writing. However, spot data exists that suggests that the percentage of high-tech employees as a percentage of total employees has not fallen in these industries since the Markusen data was collected. For example, of the European Space Agency’s staff in 1991, 60 per cent were high-tech employees, and the Agency is a ‘typical medium-sized, talent-intensive organization’ (Sadler, P. and Milmer, K. (1993) The Talent Intensive Organization. Special Report P679. Economist Intelligence Unit, London.) Another factor that will have raised the proportion of high-tech employees in these organizations in the 1990s and 2000s is that support and low-skilled functions have increasingly been outsourced from high-tech companies to other specialist outsourcing organizations.

It is a common misunderstanding to equate high-tech with high growth since the popular press tends to focus on the growth sectors of high-tech industries. While data from *Inc.* magazine shows that high-tech industries do indeed grow faster than most industries, this is not always true. In the 1987 *Inc.* 500 list of the fastest-growing firms in the USA, 183 were classified as high-technology-related firms. Five of the top 10 and 27 of the top 50 fastest-growing firms in the list were high-tech. Firms on the 500 list averaged a 13-times increase in sales during the previous five-year period.

In another listing – this time by *Venture* magazine – of the 50 fastest-growing companies that broke the $100 million annual revenue barrier in ten years or less, half were computer related. The list of technologies used by these companies seems almost endless: Lifecodes (no. 348) provides DNA testing, while PowerLight (no. 186) sells solar-electric products.

Even in seemingly non-tech markets, some *Inc.* 500 companies are using patented technical innovations. A new phenomenon is the importance of Internet-related companies, which represented 12.8 per cent of the 500 fastest-growing companies in 2000. Many high-growth firms are small firms, as noted above, because it is easier for small than for large firms to grow; but despite this platitudinous claim there really is something special, we believe, about high-tech firms. At every stage of economic expansion it is new technology that is one of the most important factors in driving economic growth. Railways are in many respects low-tech now, but when they were high-tech they comprised over 20 per cent of stock market valuations in England, as the telecoms media and technology sectors did recently.

Another reason to look at high-tech firms in particular is that even within large firms, individual business units are increasingly treated as independent or semi-independent small firms – for example, the Java business within Sun Microsystems or the healthcare management consultancy business unit within IBM. For these two reasons it is worth paying special attention to small high-tech firms. When compared with small firms in general, high-tech firms do tend to offer more opportunities for growth. However, rapid and sustained growth occurs only in a relatively small number of firms. There are many firms that can be classified as small high-tech firms which experience at best only modest growth and at worst no growth and stagnation. Venture capitalists sometimes refer to the latter as the ‘living dead’.

Just as there is no one commonly used definition of high-tech, so there is no wide agreement about how to define a growing firm. Definitions of growing firms typically revolve around the rate of growth in the number of employees, but they should probably also take account of the revenue growth. However, in many areas
of high-tech, particularly biotech and medicines, there is a long gestation period between initial investment and hiring and revenue growth, and in these cases high growth could more reasonably be defined in terms of the growth of patent applications. The vast majority of the firms interviewed for the research underlying this book had less than 500 employees and the majority had between 50 and 150 employees.

Even defining small is difficult, particularly in the service sector. Distribution businesses, for example, may show comparatively high revenues but still have relatively few employees. Conversely, firms undertaking contract research or providing technical consulting services may have relatively low revenues and more employees. As a general guide, however, the majority of technology-based small firms are likely to have sales revenues of less than $100 million, with the vast majority having sales revenues of between $5 million and $50 million.

Quantitative measures alone, however, are not adequate in defining the growth of high-tech firms. Growing high-tech firms have a distinctive set of organizational characteristics, many of which continue long after the firm’s growth has plateaued, and have an impact on how a turnaround is undertaken. This is especially true of the small high-tech firms which grew extremely fast, and often at a compound growth rate in excess of 100 per cent per annum for five or more years. Such firms grow into large businesses as defined by revenues and numbers of employees, but continue to exhibit the organizational characteristics of a small firm, even though on occasion revenues may be in excess of $1 billion and growth may be slowing or declining. The growth of Netscape, an Internet portal and web browser company, and the management problems that it faced in the mid 1990s provides a good example of such a company. The executive or team tasked with turning around a high-tech business, whether it is small, large or part of a corporation, must understand the dynamics of growing high-tech firm culture, especially if the business unit in question was founded less than ten years ago.

As we have shown, many high-tech, high-growth firms are small firms or business units with small firms’ characteristics, and we will spend some time now looking specifically at small firms. Apart from their size, small firms have other special characteristics which influence the way they are managed. Two characteristics stand out: the influence of the founder or founding team, and the firm’s lack of resources. A high proportion of small firms – particularly young firms which are predominantly in high-tech sectors – are still managed by their founders or founding team. In some instances the founders may have relinquished management responsibility but will still exert influence through their equity control. Founders typically take executive roles in top management and exert a strong influence on the direction and success of the firm. In small firms the founder’s goals are usually the same as the corporate goals.

Besides the founders, the second characteristic of small firms is the lack of resources, both financial and human. Small firms rarely have strong balance sheets.
Many are undercapitalized, either because the founders do not wish to give up equity or because capital is difficult to obtain, particularly for very young firms which have yet to prove that they have a winning business. Resource constraints are not only financial – managerial resources are generally thin and the firm’s capabilities rather narrow. Resource constraints can show up in all areas of the business – both at the strategic level, when the firm drifts along, not knowing how to control its destiny, and at the operational level, where many technical, marketing, production and financial skills may be absent.

**Types of firm**

Whatever criteria we use for defining high-tech firms, there is still a wide range of business types that make up the growing high-tech company sector. If we so wish, we can classify high-tech firms into product and service firms, and then further classify the categories according to product or service characteristics, such as the degree of product or service standardization, software versus hardware products, industrial products versus consumer products, capital goods versus consumable items, original equipment manufacturers (OEMs) versus end-users, etc. In practice, any classification tends to be arbitrary since the activities of many firms span more than one classification. Few hardware firms can ignore software, and the distinction between what is standard and what is customized is blurred.

The main thrust of the research on which this book has been based has been towards product-based firms. However, we have not ignored service firms since they share many of the distinctive characteristics of the product-based firms. They are susceptible to rapidly changing technology and uncertain market conditions, and are likely to have a high proportion of technical staff who need managing in a special way. Those firms providing manufacturing, distribution and service and maintenance for third-party products are not strictly high-tech since they do not invest in research and development and they do not use technology as a source of competitive advantage. However, since their success is dependent on the success of third parties, which are high-tech firms, they are subject to all the uncertainties and risks which are characteristic of the high-tech sector.

**FORCES DRIVING FRAGILITY**

The young high-tech firm is the most fragile. Even those firms that are profitable and growing well in areas of strong market demand are vulnerable to major hiccups that can threaten the existence of the firm in a matter of weeks. Most high-tech firms that have been regarded by the investment community as success stories have been through a severe crisis at some stage in their history. The nature of this vulnerability,
or fragility as it will be called throughout this book, results directly from the characteristics that make growing high-tech firms different from other growing firms or from more mature technology-based firms such as turbine manufacturers.

There are six factors inherent to high-tech firms that cause fragility:

1. The rate of technological change.
3. The nature of competition.
4. Employee characteristics.
5. Resource constraints.
6. The high-tech entrepreneur and the founding team.

These factors are summarized in Figure 1.1, and each is discussed in turn below.
The rate of technological change

There is tremendous strategic uncertainty associated with the high-tech environment. Technological change is often difficult to predict, as are time and costs required to develop and commercialize new technology. In many areas of technology, particularly leading-edge technologies, there are significant disagreements between the experts about which of several competing technologies will work. Many growing high-tech firms, especially small ones, lack the resource to develop competing technologies and therefore usually have to bet on one. The problem is often exacerbated by uncertainty about the timing of the technological trends. Trends which are slower to materialize than originally forecast mean that the small high-tech firm may run out of money before it ever gets off the ground, while a more rapid rate of technological development may mean a small firm lacks the resources to keep up with its competitors.

The short product life cycle of many high-tech sectors means continued product competition and the need to avoid product obsolescence to ensure survival. As a general rule, the shorter the product life cycle, the more fragile the firm. While growing high-tech firms are traditionally flexible and quick to respond to changing market needs, very short product life cycles do not give the growing firm much opportunity to recoup their product and market development costs before the next generation of products has to be launched. Furthermore, since the typical growing firm has a narrow product range it tends to ‘bet the firm’ each time it launches a new generation of products. A single product failure therefore leads to a major crisis and sometimes insolvency.

Market volatility and uncertainty

The rapid and often discontinuous change in demand in high-tech markets, rapidly emerging new competitors (many of whom disappear equally quickly) and rapidly shifting competitive strategies produce a marketplace in which it is difficult to plan. ‘Twelve months is a long-term plan in our business,’ is a comment one often hears in the personal computer (PC) market, for example. In 1997 executives in IBM’s PC division said that most of their PC models were profitable products for only a few weeks, after which new models had to be launched to maintain profit margins. Again, generalizations are dangerous since there are some niche market sectors where competitive conditions are relatively stable, although the general trend is towards more new entrants into most markets when they reach a certain size. With market information usually inaccurate, obsolete or unavailable, there is likely to be a high degree of uncertainty about the market.

History shows that although high-tech markets can grow at phenomenal speeds, they can also disappear almost overnight. The handheld-computer/PDA (personal
digital assistant) market of the late 1990s and early 2000s provides a classic example. Inventories were built up ahead of demand, then demand evaporated almost overnight. The subsequent shakeout saw firms like 3-Com (particularly its Palm division) in the USA and Psion in the UK experience considerable earnings surprises, with Psion deciding to exit completely from the PDA market – a market it had founded.³

Most new fast-growth markets are characterized by an enormous amount of hype and euphoria about growth potential. One US study in the mid 1980s showed that high-tech forecasts of market demand tended to be wildly optimistic: in five different sectors, forecast demand five years ahead averaged 250 per cent higher than actual demand.¹⁰ Many industry commentators take a very dim view of the forecasting of industry trends. William Shanklin, for example, is on record as equating much existing technological forecasting to quackery, although he is not completely against it,¹¹ and management gurus Gary Hamel and C.K. Prahalad are also highly critical of the way that senior corporate management tends to use forecasting.¹² There is no shortage of evidence for this view, and we will limit ourselves here to giving just one of the many amusing examples. Yale University famously awarded a C grade to the term paper in which the future founder of Federal Express, Frederick Smith, set out the initial business plan for that business. C.M. Christensen distinguishes two types of innovation, sustaining and disruptive, and suggests that most of the time sustaining innovation gives many large firms a better investment return, but occasionally a firm will be brought to crisis by a competitor’s successful exploitation of disruptive innovation. His research identified six steps in the emergence of ‘disruptive technologies’¹³ – technologies that can put a high-tech firm of any kind into a turnaround situation:

1. Large firms often invent disruptive technologies.
2. The inventor’s marketing department analyzes the prospective demand for the disruptive technology from its largest customers and concludes that there is no business case.
3. The inventor of the disruptive technology continues investment in its traditional technology, which produces excellent results, usually by way of incremental technical improvement and high customer satisfaction.
4. Employees leave large firms and set up entrepreneurial businesses to exploit the disruptive technology, and by a process of trial and error develop viable editions of the disruptive technology.
5. The entrepreneurial ventures experience very high growth at the expense of the incumbents.
6. The incumbents are usually unable to re-establish their dominance in the new technology.
Christensen also offers two principles which may be useful to managers involved in high-tech turnarounds. First, let a firm’s customers, not its managers, determine its resource allocation; and second, markets that do not yet exist cannot yet be analyzed, so management must learn to live with incomplete knowledge of the future.

New technology can be applied to existing markets or can create whole new markets. When new markets are being created, considerable uncertainty usually exists as the market emerges but has not yet shown signs of much commercial promise. Even when the market need is apparent, the price of products using competing technologies may be dramatically reduced, thereby delaying or permanently putting an end to the prospect of market growth. Apart from consumer electronic products, the buyers for high-tech products and services are industrial organizations. Thus, with a few exceptions, the demand for high-tech products is derived demand. Many of the customers are themselves competing in high-tech industries which are subject to all the uncertainties being described.

The nature of competition

High-tech firms rely on technology as their principal source of competitive advantage. The technology is usually embodied in a superior product (or service) offering that gives the customer greater satisfaction than competitors’ products. A superior product offering means more features than competitors’ products for the same price, or similar features at a lower price. The notion of a superior product implies not only just the physical attributes of the product itself but also those product dimensions which give the customer confidence that they are buying a superior product. In high-tech industries the confidence-building product dimensions are usually assured quality, reliability of supply, and reliable after-sales service.

Customers for high-tech products tend to be demanding. Most are industrial customers which are themselves high-tech firms or using technology to give them a competitive advantage in a more traditional industry. They are particularly unforgiving of poor quality, which impacts on the performance of their own products. Although there are exceptions, high-tech customers rarely show much loyalty to their suppliers unless significant switching costs are present. They are often sophisticated buyers who are well aware of the alternative product offerings on the market. When a firm stops providing superior customer satisfaction – as perceived by the customer – it loses credibility with its customers extremely fast. Growing firms are particularly vulnerable since customers, knowing they lack adequate resources, often adopt a dual sourcing strategy to protect themselves. Dual sourcing by customers inevitably increases the competitive risk for a growing firm.

For as long as the growing high-tech firm can provide superior customer satisfaction it has a competitive advantage. Where this advantage is based on the
technological superiority of its product or service, the advantage is often short-lived. Technological advantages are more often than not easily imitated by competitors, and patent protection is weak or non-existent for young high-tech firms. Thus any product superiority is unlikely to be sustainable unless the firm can find a way of always being one step ahead of the competition: not an easy task for the typical growing high-tech firm.

The nature of competition is made more uncertain by the fact that industry structure is often ill-defined, particularly in emerging markets. The rules of competition, the degree of industry rivalry and the barriers to entry can all change extremely rapidly.

**Employee characteristics**

Technical employees play a critical role in creating strategic advantage for the high-tech firm. The motivational characteristics of these employees, often young, well-educated individuals with high job mobility, are a principal source of fragility. Normally in high-tech companies, these employees want challenging work, high pay and continuous recognition for their work. They are the principal assets of high-tech firms and their job mobility constantly threatens the existence of the firm. The rapidly changing technology and market conditions mean that the firm’s speed of response is critical to its success, something which is endangered if the cumulative learning within the firm is dissipated. Not only do the new recruits have to go down the learning curve all over again, but experienced technical employees may take their know-how to competitors. This problem is partly alleviated by the tendency for growing high-tech firms to locate in proximity to one another – in Silicon Valley in California or the M3/M4 corridor in the UK, for example – so that they, in turn, can recruit experienced employees from other firms.

The importance of technical employees as the firm’s principal source of competitive advantage leads some growing firms to develop a technology-led culture, which can be a great strength in a young and growing market but becomes a liability as competition increases and a more marketing-led culture is required. Changing corporate cultures is notoriously difficult and yet the need may occur very quickly as markets mature rapidly and new, often larger, firms enter the market. Some of the most successful high-tech firms develop extremely strong corporate cultures embodying the informality and flexibility which is necessary to cope with change. As long as the market is growing and the firm is doing well, such cultures can generate a high degree of excitement and be very motivating for those working within them. However, when the market and technology change, as inevitably they do, and radical changes are necessary to avert or deal with a crisis, there can be a rapid decline in morale which threatens the firm’s survival.
Resource constraints

Limited resources is the one characteristic that is common to nearly all growing firms. Growing high-tech firms, even if well funded by venture capitalists, are no exception since money alone does not guarantee success. In fact, growing high-tech firms are regarded as extremely risky investments by the financial community and must usually rely on equity rather than debt financing in order to grow – here size makes little difference. Amazon with its multi-billion-dollar sales revenue is hardly small yet is undeniably high-tech and growing, but nonetheless many analysts rate it as risky. One measure that venture capitalists often use to assess the short-term vulnerability of firms is how long the firm can survive (at its current level of expenditure) without obtaining any revenues. For most growing high-tech firms this is a matter of only months and acts as a potent reminder of the resource constraints facing such firms. If a growing firm cannot make a credible case that healthy profit is at hand or likely in the near future, then financial constraints may mean that the firm can never afford to invest in the number and calibre of people in the technical and marketing areas that it needs to break out of its current situation. If, on the other hand, sales and profits are increasing and the firm is performing well financially, the growing high-tech firm also finds itself people constrained, i.e. it is difficult to hire the number and calibre of technical employees the firm requires in order to manage the growth.

Most successful high-tech firms tend to focus on one or a few specialized products often designed for a specific customer segment. Consequently they are usually characterized by a narrow and highly specialized resource base. One central idea or technology constitutes the organization’s distinctive competence. The origin of the firm is often a technological breakthrough on the part of an entrepreneur. Yet the entrepreneur often lacks the management skills necessary to commercialize the products and develop the firm. Each time entrepreneurs comes across new management tasks of which they have no experience, there are likely to be delays, mistakes and inefficiencies. In an environment which is stable or moving considerably more slowly than the high-tech environment, the growing firm entrepreneur and management team may be able to adapt to the changing situation. In a high-tech environment, the need for speed to take advantage of the short windows of opportunity means that errors are more likely to lead to a crisis. Learning by making mistakes on the job is just not a viable option.

The high-tech entrepreneur and the founding team

Many high-tech firms are created to achieve intellectual and professional goals as much as financial goals. The founders of the more radically innovative, entrepreneurial organizations often prefer the opportunity to explore innovative technologies rather than maximize financial returns. Many such founders are more
committed to a particular technology than to a market, and some will sacrifice significant growth opportunities in technology and markets they consider peripheral rather than risk losing their chosen technology focus. Studies have shown that growth-oriented entrepreneurs in both high- and low-tech firms are characterized by distinct psychological traits which give them a propensity towards growth. Such entrepreneurs have significantly higher levels of energy, risk-taking and social adroitness than their low-growth counterparts. They also have a greater desire for autonomy and adapt readily to change.20

Perhaps even more important than the goals of the founder (or the founding team) are the capabilities and commitments of the founder(s). The technical capabilities of the founding team are vital not only to the development of the first product but also to subsequent product development activities, as will be shown later. Leadership and management capabilities are also critical, but it is all too rare to find founders who combine strong technical capabilities with good leadership skills and sound management practice. Hambrick et al. noticed that ‘the chief executives of high-technology firms differ from their counterparts in low-technology firms in ways that follow logically from the special requirements of the high-technology setting’.21 However, capability alone is not enough for a high-tech firm to be successful. What is just as important, and sometimes more important, is total commitment by the founders not just to the firm as a whole but also to those key areas where fragility, if not correctly dealt with, will lead to the demise of the firm. Considerable academic research exists which links small-firm performance to the abilities of the top management team.22

The presence of founders as management, or even as shareholders if they have relinquished management responsibilities, has a profound effect on the management of high-tech firms. On the one hand they often provide the entrepreneurial dynamism necessary for success, but at the same time their goals and shortcomings may be the root cause of crisis and failure. In particular, their management style may hinder effective decision making and implementation. The speed of change in the high-tech sectors requires, for example, fast strategic decision making because delays and indecision will quickly erode any technical and market advantages the firm may have. Thus, the inability to make quick decisions under conditions of great uncertainty and other types of behaviour on the part of the founder of a growing high-tech firm will hinder firm performance and increase its fragility.

The degree of fragility brought about by the presence of the founder depends on how easy it is for the board of directors to remove the founder if the firm is underperforming. Where the founder has the majority shareholding and is unwilling to accept the fact that he or she cannot run a company, the situation is obviously more fragile. Even where the founder no longer has majority control but is still a major shareholder, their influence may still be very strong and removing them may be difficult. While the vast majority of growing high-tech
firms are still run by their founders, the introduction of a new chief executive does not automatically reduce the fragility and it may well increase it if the hired hand is less capable than the entrepreneur of running a business.

In theory, the firm’s chief executive, whether the founder or not, should provide the management capability to combat effectively the other five forces driving fragility (i.e. the rate of technological change, market volatility and uncertainty, the nature of competition, employee characteristics and resource constraints). However, in reality, the chief executive of the growing high-tech firm needs to be almost superhuman to grow a business successfully over a long period of time and will in practice have some personal failings which will contribute to the fragility of the firm.

**MANAGING FRAGILITY**

The combined effect of the six forces driving fragility is to give the high-tech firm a high propensity for crisis. Crises of one type or another are inevitable and Chapter 4 shows how within weeks what appeared to be a healthy firm became a turnaround situation. A single event, such as a quality problem or a new product introduction by a competitor, can be enough to trigger a chain reaction which causes a severe crisis and puts the very survival of the firm in question.

There can be no simple panacea to the issue of fragility since the inherent characteristics of high-tech firms are such that considerable risk is inevitable. The high-tech firm is competing in a hostile environment where considerable technological, market and competitor risk exists, with resources that themselves are scarce (money, management know-how, company reputation, etc.) or vulnerable (the technical employees). Investing in and working in such companies can be exciting and rewarding but the risks will always be high until the firm has grown to such a size that some of the forces driving fragility have been negated. The larger high-tech firm is still vulnerable to changing technology and changing market conditions but is better placed to develop sustainable competitive advantage to deal with the nature of competition, and often has much greater resources to deal with any crisis that may develop. All growing firms suffer from resource constraints and have to take account of the motivation of their employees and the influence of their entrepreneur or chief executive. What is different about the high-tech firm is the particular combination of the six forces it must overcome in order to survive and prosper, and these are especially relevant in a turnaround.

One aim of this book is to convey to the reader some of the lessons that have emerged from research in the USA and Europe into the management practices of growing high-tech firms. The research on which this book is based shows that the more successful high-tech firms adopt appropriate strategies and actions for dealing with the forces driving fragility. The management practices of the most successful firms deal with these forces in such a way as to avoid or minimize the
problems that arise due to the characteristics of the firms and their environment. In the chapters that follow, we will describe the strategies and actions used by successful, growing high-tech firms. These firms have the following characteristics in common:

- They seek ways of overcoming the resource constraints through innovative actions (e.g. designing foreign sourced components into a product for a foreign market for ease of service) or entrepreneurial behaviour (e.g. a deal with a major customer).
- They invest management time and effort in ensuring that key areas of potential crisis are constantly monitored and controlled (e.g. product quality, the morale of technical staff).
- They avoid product-market options which are too risky given the firm’s limited resource base (e.g. getting into completely new technologies).
- They focus their resources on products, markets, technologies, projects, etc. so as not to dissipate the firm’s limited resources.
- They continually strive to build and maintain competitive advantage through differentiation which permits them to earn high margins.
- They pay careful attention to the timing of product-market entry decisions.
- They remain flexible and responsive to customer needs.
- They keep costs variable and financial leverage (gearing) low.
- They manage their human resources in a way that recognizes the unique characteristics of high-tech employees.
- They introduce ‘professional’ management in a selective way so as not to kill the innovative capabilities of the firm.
- They develop flexible, high-performing organizational cultures.

In many instances managing fragility involves a delicate balancing act between the external forces driving fragility and the firm’s internal resources. For example, the rate of technological change may mean there is a short window of opportunity to develop and launch new products and that any delay will mean being leapfrogged by the competition. However, due to limited internal resources and capabilities the firm is unable to launch within the desired time-frame a product that is fully tested and can meet customer delivery requirements. Does the firm take short cuts in product development and risk losing its customers’ confidence? Diversification provides another example. Many growing high-tech firms are heavily dependent on one product or one major customer, partly because of the need to overcome resource constraints. They then decide to diversify their products or customer base to reduce their dependence on a single source of revenue. In theory this is fine, but in practice their managerial and technical resource base is so narrow that the diversification efforts are unsuccessful. The firm ends up being more fragile than it was before and a full-blown crisis often ensues.
DECISION MAKING IN THE FRAGILE FIRM

Strategies and organizational practices that provide a good strategic fit with the environment and the firm’s resources are the substance of this book, but unless they are accompanied by an appropriate decision-making style, success will be elusive. To cope with the forces driving fragility, management must adopt a decision-making style which is fast, analytical and bold.

Fast decision making

Fast decision making helps firms cope with the rapid pace of change in their environment. Windows of opportunity are short in high-tech industries and so a management that procrastinates and postpones making decisions until more information is available or more analysis is due tends to lose out. Research in the rapidly changing environment of the PC industry\(^\text{25}\) and reports from the chip fabrication industry\(^\text{26}\) indicate that the shorter the time-frame in which strategic decisions are made, the better the performance of the firm. Research in turnaround management also finds that fast decision making is important\(^\text{27}\) (this last point may strike the reader as obvious, as it does the authors, but there is always scope to be yet faster).

The five principal characteristics of fast decision-making firms are:

1. The use of extensive information, particularly real-time information on the firm’s operations and competitive environment.\(^\text{28}\) Extensive use is made of qualitative tracking of operational indicators such as orders, inventory, cash flow, product returns and competitors’ moves rather than reliance on accounting data. Real-time information permits managers to spot problems and opportunities sooner and may even help to develop their intuition.\(^\text{29}\)

2. They consider multiple alternatives simultaneously. This speeds up decision making by building confidence that the most viable alternatives have been considered, reducing the psychological commitment to any one alternative (which permits shifting between options if necessary) and by providing a fallback position if one alternative fails.

3. They use experienced counsellors. While the chief executive might obtain advice and information from all members of his or her management team, faster decision making appears to occur when the chief executive also has a ‘confidante’ or special advisor. Counsellors provide a sounding board for ideas, relate the issue in question to past experience and generally share the decision-making burdens. Counsellors are typically outsiders such as non-executive directors, consultants or venture capitalists, or senior (often older) executives who ‘have been around’ for a long time.
4 They take active steps to resolve conflicts. Some degree of conflict is inevitable and healthy within a management team, but the decision makers themselves must take specific steps to resolve conflict if the speed of decision making is not to be affected. The leadership style of the chief executive is key to this process.

5 They integrate key strategic decisions and action planning within the decision process. Decision integration helps executives see the broad picture: how the various decisions relate to each other and how they relate to action plans. If decisions are treated as discrete events, functional executives are often unable to build a mental map of what is happening, which in turn leads to ambiguity and lack of confidence in what they are doing.

Analytical decision making

The lack of accurate and complete information about the marketplace, competitors and technological development means that it is easy to make costly mistakes. Some management teams in high-tech firms ‘muddle through’, adapting to a changing environment in a reactive mode, but there is some evidence that effective teams attempt to structure the situations facing them using rational decision-making processes. The better performing firms tend to use a more analytical approach and adopt a more thorough and continuous search for strategic alternatives. While rational decision making provides order to a rapidly changing environment, strategy must remain flexible. Some growing high-tech firms have achieved this by building implementation triggers into the strategic plans. Trigger mechanisms such as the achievement of quarterly results or specified actions by a competitor allow management to keep options open and avoid major errors.

While the firm’s strategy may remain flexible it is important that management articulate clear and explicit goals to provide employees with a strong foundation on which to build their actions. The most successful firms appear to develop a simple statement of strategic intent and communicate this very clearly to all employees throughout the firm.

Bold decision making

Rapid change, severe time pressure and crisis situations are classic causes of managerial stress. A common response to such situations – often found in failing companies – is to centralize authority and continue with known recipes for success. However, in environments undergoing radical change, innovative approaches are often required. Product strategies which are imitative, or which are at best incremental improvements to competitors’ products, are likely to fail. The growing
A high-tech firm must be constantly differentiating itself and reassessing its new position to deal with shifting technologies and changing competitive strategies. This requires experimentation and a willingness to take risks.

The use of rational, high-quality decision-making approaches which involve structured discussion and careful analysis may seem to be in conflict with the need to move quickly and boldly. Conventional management thinking believes there is a trade-off between quality and speed of decision making and that innovation is brought about more by a series of incremental actions than by analysis. In a high-tech firm, the dilemma facing management is that it is easy to make a mistake by acting too soon, but it can be equally disastrous to delay making a decision or to imitate competitors. The dilemma is made worse by the fact that it is often difficult to predict the significance of change as it is occurring, as was the case at Netscape, which among other problems failed to anticipate or manage the decline of the ‘standalone’ browser market and the rising importance of the corporate market. The signals indicating a need for change are often very weak. To be successful, management in the growing high-tech firm must learn to live with the dilemma. They must make strategic decisions carefully but quickly and be bold, while at the same time remaining flexible by building in implementation triggers.

**SUMMARY**

The most important way in which high-technology firms differ from other firms is that they operate in industries where firms use process or product technology as a major source of competitive advantage. Two other significant differences are that they exploit recent scientific or technological advances, and that high-tech industries are growing industries. High-tech industries have three defining criteria:

1. Product or process sophistication.
2. Research and development intensity.
3. Technical employees.

Young high-tech firms, and even some established high-tech firms, are fragile, which means that their prospects may decline fatally in a short time span because of the inherent risks of the high-technology market. There are six sources of this risk:

1. The rate of technological change.
3. The nature of competition.
4. Employee characteristics.
5. Resource constraints.
6. The high-tech entrepreneur or the founding team.
The turnaround must understand the particular areas of fragility in the firm and must manage that fragility. Key to this is decision making that is fast, analytical and bold. Not all managers have minds that are up to this challenge. Firms which have made successful high-tech turnarounds have exhibited the following characteristics within a fast, analytical and bold decision-making framework:

- Innovative and entrepreneurial behaviour is used to overcome resource constraints.
- Management effort is focused to control key areas of potential crisis.
- They avoid product-market options which are too risky for the firm’s resources.
- They focus their resources on products, markets, technologies, projects, etc. so as not to dissipate the firm’s limited resources.
- They build and maintain competitive advantage through differentiation which permits them to earn high margins.
- Careful attention to timing of product-market entry decisions.
- Customer needs drive the organization.
- Fixed costs are changed to variable and gearing (leverage) is minimized.
- The unique characteristics of high-tech employees are recognized.
- ‘Professional’ management is introduced without killing innovative capability.
- There is a flexible, high-performing organizational culture.

Notes
2 The ten sectors all ranked as ‘high-tech’ on the basis of a product sophistication analysis by the Massachusetts Division of Employment Security as cited in Vinson, R. and Harrington, P. (1979) Defining High-technology Industries in Massachusetts. Commonwealth of Massachusetts, Department of Manpower Developments, Boston, MA.
5 Mangelsdorf, Martha E. (2000) ‘IT is the year of the other Internet companies’, Inc., 15 October.


15 The lack of patent protection is discussed further in Chapter 3.

16 See Chapter 4 for discussion of the unique motivational characteristics of employees working in the small high-tech firms.


18 Stinchcombe, A. ibid.


24 There is a growing body of research on the ‘liability to newness’ concept. See, for example, Singh, J.V., Tucker, D.J. and House, R.J. (1986) ‘Organizational legitimacy and the liability of newness’, Administrative Science Quarterly, 31, pp. 171–93.


28 Real-time information is defined by Eisenhardt as information about the firm’s operations or environment for which there is little or no time lag between occurrence and reporting.


Product-market and competitive risk

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Product-market and competitive risk

How well a high-tech firm undertakes product development and marketing activities determines its competitive advantage (or lack of it) and its chances of becoming a turnaround situation. There are six factors which determine new product success for the high-tech firm and six critical market development issues which drive success. Understanding these factors helps diagnose the cause of high-tech underperformance and the magnitude of the turnaround task. The successful firm will always be challenged by competitors, both new entrants with alternative or improved technologies and well-established players with extensive access to finance and know-how. The nature of competition high-tech firms face and the challenges this poses for management are discussed at the end of the chapter, as are various co-operative strategies which successful high-tech firms use to reduce both their product and market risks.

PRODUCT DEVELOPMENT

Very few firms are able to repeat their early success in designing and launching innovative products. Most firms’ subsequent products are only incrementally better than those of their competitors, and many firms introduce me-too products in an attempt to grow.

Table 2.1 shows the results of a study of 24 small high-tech firms in the UK. The emphasis on subsequent product development in the small independent company is on improving and enhancing the first product. New product development is regarded as an iterative and evolutionary process, with new products being derivatives of the first product. Many well-established firms still appear to be single-product firms even after substantial new product activity.

<table>
<thead>
<tr>
<th>Type of product</th>
<th>Percentage of companies</th>
</tr>
</thead>
<tbody>
<tr>
<td>New</td>
<td>4</td>
</tr>
<tr>
<td>Incremental</td>
<td>83</td>
</tr>
<tr>
<td>Me-too</td>
<td>46</td>
</tr>
</tbody>
</table>

Expenditure on new product development is nearly always directed towards development rather than research: few high-tech firms undertake basic research. New product ideas evolve mainly from the perceived needs of the marketplace, although there is a wide spectrum of practice: from the 100 per cent technology-driven company that has little or no accurate information about customer needs,
to the truly marketing-led company. Six factors determine the success of new product development activities after a successful first product has been launched:

1. Orientation to customers’ needs.
2. Emphasis on strong technical superiority.
3. Continuing involvement of the entrepreneur.
4. Focusing scarce technical resources.
5. Access to multiple sources of technology.

**Orientation to customers’ needs**

Most high-tech firms believe that their product development efforts are geared to meeting a customer or market need, or are geared to overcoming weaknesses in competitors’ products. The belief is usually genuine: the problem is that the belief is based on management’s mistaken perceptions of customers’ needs. Identifying customers’ needs for high-tech products is notoriously difficult since customers are rarely able to specify their needs, particularly where new technology is involved. As markets grow, it becomes easier to identify these needs but the size of market opportunity narrows, possibly resulting in limited scope for growth.

Some high-tech entrepreneurs appear to have visionary capabilities which enable them to see needs before the customer realizes he or she actually has such a need. Steve Jobs appears to have had this capacity at Apple. In his book *Odyssey*, John Sculley quotes Job as saying:

> What we want to do is change the way people use computers in the world … What we’re doing has never been done before … my dream is that every person in the world will have their own Apple computer. To do that we’ve got to be a great marketing company.1

Other less well-known entrepreneurs profess to have this vision, only to be proved wrong by the marketplace.

In practice, there is little or no substitute for the old cliché of ‘being close to the market’. Most successful small firms are close to their market and gear their product development activity accordingly. Some of the most successful firms have deliberately developed custom or semi-custom products alongside standard products in order to be close to their customers. The identified needs of customers are then fed into their product development programmes. A secondary benefit of developing custom products is that the customer pays for the development work, the firm often later moving into semi-custom products on the back of customer
financing. Other ways in which firms keep close to the market are through user groups and in-house product support functions that gather first-hand information about customers’ needs. Intensive interaction with customers is critical, as indeed is interaction internally between the product development and marketing functions.

Emphasis on strong technical superiority

Successful high-tech firms like Intel, Capstone and Wolfram Research place heavy emphasis on establishing technical superiority over competitors. This can be achieved only if the company has strong technical capabilities. In the early stages of the technology life cycle, there are likely to be frequent and major product innovations. Strong technical resources are required to keep pace with these developments, otherwise the firm’s product performance will fall behind that of its competitors. In Slatter and King’s study of new product development in the computer-aided design (CAD) industry, those firms where the product development team had higher academic qualifications, more experience and had won technical awards were better able to cope with product competition than their less technically able counterparts. Even when firms relied heavily on outside sources by licensing in or acquiring third-party products, sound in-house technical resources were needed to integrate, commercialize and support such products. Successful firms are continuously in the process of enhancing their technical resources by training, retraining and motivating their staff.

Strong technical resources include not only the ability to design innovative products but also the ability to design-in quality and to design products which can be manufactured at low cost once margins start to erode. Designing-in quality is critical to success since quality problems are often a root cause of failure in young high-tech firms (see Chapter 4). While there are many reasons for quality problems, good product quality starts with basic design strategy. Designing cost out of products is also critical for competitive success once the rate of growth of the market starts to slow down and price competition emerges. Few high-tech firms find this an easy transition since their early success is usually due to following a high margin-differentiated strategy. Developing products for low-cost manufacturing requires a different approach and, many would argue, a different development team from that which developed the original innovative product.

While technological superiority can provide competitive advantage for the high-tech firm, the big danger that goes with it is blindness to the requirements of the marketplace (already discussed above) and delays in launching new products. Delays are caused by engineers constantly changing the design to incorporate the ‘latest improvements’ or waiting until they have achieved a major breakthrough, allowing them to leapfrog the competition in a significant way. Such an approach allows the faster competitor to launch more new products and to have a more up-to-date
High-tech Turnaround

product line than the slower moving competitor. Late product launches lead to products that were intended to be incremental product improvements becoming me-too products. At Oregon-based Lattice Semiconductor, part of the turnaround strategy of Cyrus Tsui, the new president and chief executive officer (CEO) hired in September 1988, was to improve the speed of product development. Within a year, Tsui had reduced design cycle times by 35 per cent to 45 per cent, and new products started to appear. Tsui believes this was crucial to his turnaround success: ‘The only advantage small companies have over big companies is their ability to execute fast and flawlessly.’ However, large companies have also become much more nimble over the past 5–10 years, and this may not hold true today.

Speed of new product development is crucial, but there is a question as to how fast firms should jump into new product development without carefully defining the price-performance features of the product. Compaq, the portable computer manufacturer, is known to have relatively short product development times, creating new machines in about nine months. However, before development starts the company may spend up to two years deciding what to make. A product definition team, made up of managers from engineering, manufacturing, marketing, sales and finance, must agree on features, performance and price before development goes ahead. ‘It’s better to leave the company in limbo than to head off in the wrong direction,’ says Joseph Canion, Compaq’s president. ‘Developing a new product is like jumping out of an airplane. One way or another you’re going to get to the ground, so you’d better be sure your parachute works.’

In the 1990s Toshiba started to gain market share from Compaq (becoming top supplier in the US market in 1996 and Asia-Pacific in 1997) and part of its strategy has involved a very large number of new product introductions, despite many of its distributors in the US being critical of Toshiba’s relationship with them. It is interesting to speculate to what extent Compaq’s slightly cautious approach may have helped Toshiba.

Product superiority implies that the high-tech firm must try to make its product difficult to imitate. If it has patents which it has the time and resources to protect, it may be able to maintain a technological lead until there is a technological breakthrough by a competitor. If this is not the case, the firm must try to make imitation difficult and expensive for potential competitors. Successful exploitation of a technology typically requires the acquisition or development of complementary technologies. It will often be in the interest of the high-tech firm to obtain such technologies (usually from external sources) so as to develop a multitechnology-based system. The successful interface of technologies often requires considerable learning and expertise on the part of the organization and can act as a source of competitive advantage, since it makes imitation more difficult and expensive.
Continuing involvement of the entrepreneur

The continued presence of the entrepreneur (the founder or one of the founding team) at a senior level in the organization is often critical to successful product development. This point has been made frequently in the literature and is confirmed by the authors’ own work in the UK. When developing the Macintosh computer at Apple, Steve Jobs is quoted as saying: ‘This product means more to me than anything I’ve ever done in my whole life. I love this product …’ The critical role of the entrepreneur is to match the technology with the market – or, as one writer observed, ‘to understand the user requirements better than competitive attempts, and to ensure that adequate resources are available for development and launch’. This definition highlights two key aspects of entrepreneurial activity:

1. The need for the entrepreneur to communicate with and understand the firm’s technology and market.
2. The need to have the authority and power to allocate resources so as to drive the new product development process from the idea stage through to successful launch.

The continuing importance of the entrepreneur’s involvement and commitment is often apparent only once the entrepreneur is unwilling or unable to perform the new product development role. This is usually a consequence of growth. Growth often leads to a changing role for the entrepreneur within the organization, and crisis often leads to his or her removal from the company. However, even if the entrepreneur remains willing and able to undertake the role, the climate has to be right for innovation to succeed. It is not always well understood that entrepreneurs are motivated by freedom, power to control resources, creativity and the challenge of identifying new opportunities. Once outsiders, such as venture capitalists and professional managers, have a controlling influence on the firm, the technical entrepreneur may feel demotivated because he or she can no longer be truly entrepreneurial. A good example of this phenomenon is provided by an entrepreneur who sold his successful computer-aided design company to a larger competitor and was then asked to manage his firm as a research and development subsidiary of the acquirer. The marketing of his product was removed from his control and integrated with that of the parent company. The entrepreneur left soon afterwards and remarked:

Our acquirers thought we were a clever load of boffins and all that we wanted was to go into our research labs and develop new products. But we could not do that without closely working with sales, because not one of our
products was developed on our own. Every product was created by a process of negotiation, iteration and working closely with the customers. Since the takeover we have had disastrous development projects where we have tried to develop products in isolation from the customers. Any attempt by development people, however good their record is, will not be successful if done in isolation from customers.

Focusing scarce technical resources

The lack of technical resources is often one of the most significant barriers to growth, particularly for smaller high-tech firms. The technical staff in these firms have to divide their time between designing new products, improving existing products, and providing technical sales support and after-sales service. These four activities involve different timescales. After-sales service has the shortest lead time – the need is usually immediate – followed by technical support to the sales function, and then improvement to existing products. New product development often comes last in the order of priority. Unlike large high-tech firms, where different staff can be allocated to these four activities, the staff of small high-tech firms have to balance their time between them.

Almost no small high-tech firms identify development expenditure separately in their control systems. Although the total salaries of technical staff are known, the cost is almost never allocated according to the time spent on the four activities identified above. In those few instances where such an exercise is carried out, management are usually shocked to learn how little time (and hence money) is being invested in product development.

Besides allocating technical resources adequately across the total span of activities, the other major requirement for focusing scarce technical resources is within the product development function itself. Most product development departments aim to work on too many projects simultaneously, with the result that they spread their scarce resources too thinly to achieve results in the required time-frame. One often finds that many of the projects are ‘pet’ projects of some engineer for which the technological risk is unacceptable or the market potential is severely limited. Strong management is required to focus the activities of the development department, something which can be difficult to do without lowering the morale of key individuals, many of whom are like artists and see their pet projects akin to creative masterpieces, although they may be technological white elephants. The issue of managing technical staff is discussed in Chapter 6.

What is somewhat surprising is the difficulty management often have in small high-tech firms in getting their product development teams to allocate time to
totally new product development as opposed to improving existing products. This is a real problem in those firms designing standard or semi-customized products where the technical staff are often emotionally attached to the products they have developed in the past. As a result, they devote more time to improving existing products for which there is a proven market demand than developing new products, the success of which has yet to be proven.

Access to multiple sources of technology

Most high-tech firms develop their first product in-house but increasingly use external sources to help subsequent product development. Many quite large firms find it exceptionally difficult to keep up to date in their core technological area and impossible to have all the necessary technical skills in-house where the chosen product-market requires the use of multiple technologies to meet the customers’ needs – even IBM experienced this problem and outsourced the development of the PC. We shall discuss later in this chapter how speed is a major competitive weapon in high-tech industries. The need for speed coupled with the small firm’s lack of resources to invest in research and development means that firms often rely on external sources of technology as a means of accelerating response time. The major external sources of technology are:

- obtaining free advice by scouring all available resources. One biomedical company in the UK does this, for example, by talking to doctors at the local teaching hospital;
- liaison with (usually local) universities. This may be formal or informal, and very often it is difficult to see where the commercial linkage ends and the university’s research begins. Bodymetrics and Searchspace are two successful UK companies that evolved out of the founder’s studies in the computing department of University College, University of London; Bodymetrics develops software to measure and represent the human body, in such a way that the measurements can be used to tailor clothes very accurately; Searchspace provides software to help financial institutions and stock exchanges to detect fraudulent or suspicious transactions;
- employing highly recognized experts as consultants or non-executive directors. Many small biotechnology companies, for example, have academic founders who continue with their university posts as well as acting as scientific advisors. Professor Barry Richards of Imperial College, University of London, founded PARC Technologies which is revolutionizing aircraft utilization rates by applying a new branch of logic that he developed as an academic, but he continues to teach at Imperial;
- spin-offs from another company whereby the ‘entrepreneurial’ group brings technology with it. The Capital Markets Company is one example of many such spin-offs from IBM;
- licensing-in technology from other companies. Part of the turnaround of Brooks Brothers came with the licensing-in of high-technology which takes 20,000 measurements of a customer’s body so that individually tailored garments can be made, giving great fit at affordable prices;¹¹
- developing collaborative deals with other companies, often in the same industry, to maximize the synergistic opportunities available. This can involve sharing of proprietary information;
- exclusive rights to the research and development findings of a research body, e.g. Celltech, the leading UK biotechnology company has rights to the R&D output from the British Medical Research Council.

While external sources of technology may lower total costs, avoid ‘reinventing the wheel’ internally and provide access to specialized or new sources of technology, there are three significant disadvantages in an overreliance on external sources of technology:

1. The ‘imported’ technology is not proprietary, even if there is an exclusive agreement for its use. The company’s technology strategy, which is basic to its success and its competitive advantage, is outside its control. Any hiccup in the relationship between the company and its third-party technology supplier can spell disaster. Legal contracts rarely provide much real protection once the agreement starts to go wrong.

2. Internal technical capabilities are not developed, which acts as a severe brake on the strategic development of the business.

3. Delays in product development are likely due to the difficulty of transferring technology from third parties. Most firms underestimate the time and costs involved in this process. Products that have been designed in research laboratories and universities frequently have to be redesigned to suit the particular requirements of the marketplace.

There is a complete spectrum of companies, from those which rely 100 per cent on internal sources to those that have none of their own technology and rely exclusively on outside sources. Total reliance on internal sources makes companies very vulnerable to shifts in technology, and it is unlikely that any high-tech company can survive the long term if it believes its own technical people have a monopoly over knowledge. Equally, at the other end of the spectrum, total reliance on external sources will probably lead to a poor product range unless the firm develops its capabilities as an efficient marketeer.
Successful firms use multiple sources of technology and strike a balance between internal and external sources. AGC, for example, a UK leader in the field of plant biotechnology, combines the exclusive rights to the R&D work of the Agriculture and Food Research Council with considerable in-house expertise and continuing strong links with Cambridge and other universities’ botany research departments. Proprietary technology, from whatever sources, does not, however, guarantee sustained competitive advantage, due to short product life cycles. Companies need to develop their own in-house technical capabilities to stay ahead of the competition even if they are extensively utilizing external resources. One software company that was licensing-in product designs showed that the development expenditure needed to integrate, commercialize and support products varied from one-and-a-half times to three times the royalty expenditure during the first three years of sales (see Table 2.2).

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### Managing sympathetically

Much has been written about the management of research and development staff, and Chapter 6 of this book looks very specifically at the characteristics of managing high-tech firms and some of the difficulties of managing technical staff. However, a section on product development is not complete without mentioning how important the management of the product development function is. Strong technical leadership with clear objectives and deadlines is necessary, yet the leadership style must be sympathetic to the culture of a research and development department. It must allow flexibility and some experimentation if innovation is to flourish. Part of the leadership function must also be to ensure that there is a coherent product development strategy which avoids developing too many me-too products or spreading scarce resources too thinly. Without good leadership, good technical staff will be wasted. Leadership of the product development function requires an unusual blend of technological competence, interpersonal skills and management understanding.

For a firm’s product development activities to be robust, all six characteristics must be present. If one or more characteristics are missing, fragility increases. Rarely will everything go smoothly because the resource base of the high-tech firm
is often too thin, and unforeseen technical difficulties are inherent in the very nature of high-tech industries. Delays in launching new products and technical problems (‘bugs’) with recently launched products are the most common symptoms of deeper problems within the product development function.

MARKET DEVELOPMENT

Many high-tech firms underestimate the costs required to establish both their firm and their products in their chosen market segments. Many of the largest high-tech firms also underestimate such costs, for example within one of the largest computer and IT services companies, managers were aware of this tendency and admitted that in their experience it often took their firm two to three attempts at entering a new market, each costing several tens of millions of dollars, before a satisfactory market position was achieved. This firm’s competitors feared this company precisely because it was able to afford to throw so much at wherever it wanted to be, whereas their balance sheets were vulnerable to the resulting margin declines. In entering a market, marketing and associated product support costs can be significantly greater than product development costs – often in the order of two times greater, and sometimes more. Part of the reason for this is the time it takes to establish credibility. This problem is acute for small high-tech firms in a turnaround situation, since many of their existing customers will already have given them a last chance or even several ‘last chances’. Even large companies in a turnaround situation find that credibility among customers for high-tech products is a fragile notion that needs constant attention. A few quality problems, for example, and there may be a rapid deterioration in credibility.

Besides establishing and maintaining credibility, the other principal reason for high market development costs is the time it takes for customers to make purchase decisions. Firms always underestimate the time between initial customer interest and receipt of order. While this is a problem for all firms selling industrial goods, it is particularly acute for the small high-tech firm, which is likely to have limited financial resources and very quickly finds itself with cash flow problems due to delays in orders being placed. In some high-tech sectors where products have to go through a long customer approval process, as in the aircraft industry, for example, the delays may be considerable. In the UK, the liberalization of the telecommunications industry led to new firms entering the market for equipment and services, but there was considerable time and cost associated with seeking the necessary permissions.

This section excludes discussion of market strategies that take the firm into new market segments. We focus on six market development issues common to the high-tech firm trying to grow in its chosen target segments:
Building and maintaining credibility

During the start-up phase, establishing credibility for the company is of paramount importance since customers are reluctant to place orders, however good the product, since they are concerned that the company may not survive. This start-up problem lasts at least three years before customers start to have confidence that the firm will survive. However, the problem never goes away completely as long as the firm remains relatively small and independent, since customers know how vulnerable high-tech firms can be. Even once the firm’s credibility is established, each new product – particularly those that are radical innovations based on new, unproven technology – must establish credibility. The biotechnology industry provides plenty of current examples. One striking example is a company that markets grease-eating bacteria for cleaning drains. Since the end-users of the product are industrial and commercial kitchen staff who have little appreciation of the technology, the concept of breeding bugs in the kitchen to keep the drains clean is not easy to sell. Another company which manufactures ‘natural’ food additives using a biotechnological process takes a great deal of effort to play down the biotechnology origins of its products. Many biotechnology companies now employ public relations agencies to try to project a natural, non-scientific image to customers and the general public.

Building and maintaining credibility with customers is about keeping promises regarding delivery and service, and meeting agreed product specifications. The process takes time. There is no magic panacea other than to stress the importance of constant two-way communication with the customer, which involves both listening to and educating the customer – and the more advanced the technology, the more education is required. As the customer learns the technology, so the communication process should become more biased towards learning from the customer.

There are, however, two concrete steps that the high-tech firm can take to develop credibility: obtain a set of key reference customers and build a demonstration product or ‘demo lab’ to prove that their product(s) works. Key reference customers are typically well-known customers who are recognized in their industry as leaders and are satisfied with the firm’s product and service. If the firm has a good relationship with these customers, it can use their names to give it credibility and maybe even arrange for potential customers to visit the reference companies’ sites.
Where this is impossible, investing in one or more demonstration machines, or even a demonstration laboratory, can be important. Firms selling capital goods find that bringing potential customers to a demo lab or to a reference customer's site is the most effective way of communicating the product's performance features.

**Building market differentiation**

Nearly all but the very largest high-tech firms attempt to follow a strategy of focus via differentiation. The principal sources of differentiation are technology and service, although most successful firms strive to develop a reputation as specialists in the eyes of their customers, so that reputation, and in some instances brand names, become sources of differentiation. Designing and manufacturing low-cost products is rarely the basis of a sound strategy. Successful high-tech firms make a continuous and concerted effort to differentiate: they are committed and dedicated to their area of activity, be it a product group, a market or a technology.

Differentiation on the basis of technology is brought about through developing superior features and superior performance compared with those of competitors' products. Small firms usually use flexibility as a source of competitive advantage and give customers a wider choice by offering to customize standard products or by offering very specialized, custom-made products.14

Where the small firm is competing against larger firms in the marketplace, the most common form of differentiation is customer service. This arises because good customer service is more likely to be sustainable as a source of competitive advantage than the firm's technology, which is forever being 'leapfrogged' by competitors. Not only can high levels of service act as a competitive weapon, but close customer relationships also pay off in terms of new product development (discussed above). Customer service has become increasingly important as a competitive weapon in many electronic-related sectors as software, which had been the major source of differentiation in the 1980s and early 1990s, has become more of a commodity product.

**Linking with large customers**

Large contracts with established customers is one way that high-tech firms have overcome the credibility problem, built positive cash flows and grown their business quickly. A 1999 University of Chicago paper reported an investigation into 301 biotechnology firms and found that 'young companies can attract better reputations, access to valuable resources, and access to other important relationships with prestigious partners'.15 One of the companies investigated was Citogen, involved in proteomics and oncology, which formed a partnership with the much larger American Cyanamid. Although the Chicago report concerned biotech start-ups, the
The authors of this book have seen the same technique applied in several high-tech turnarounds. For example, one UK high-tech company that saw its market capitalization fall from over £45 million to under £3 million in less than a year, as a result of what some commentators called ‘spectacularly incompetent management decision making’, initiated a turnaround with a deal for which the sole justification was a relationship with IBM. One of the more dramatic examples of this approach in recent years is the Australian company Intellisol. Intellisol was founded in 1990, but major growth was initiated in 1995 when it formed an alliance with Great Plains Software of the US (Great Plains was subsequently acquired by Microsoft). Intellisol continued this strategy by forming an alliance with Sage, the UK accounting software firm in 1999, and also in the same year with the ‘big five’ accounting firm Deloitte Touche Tomahatsu. Revenue in 1998/99 was Aus$25 million, ahead of the Aus$22 million forecast.

Software companies, particularly those manufacturing operating systems, have employed similar strategies. Microsoft, for example, which developed the MS-DOS standard for IBM, has enjoyed huge success riding on the back of its OEM contract. Its founder, Bill Gates, became the computer industry’s first billionaire and as of January 1992 was considered to be the richest man in the USA.

Linkages are not always formal contractual relationships. Many small companies, such as custom software companies, hardware distributors and value-added resellers (VARs), have built successful businesses by riding on the back of IBM, for example. The benefit of the relationship, however, is not all one way. The larger partner may also gain. Thus, although VisiCorp sold its VisiCalc spreadsheet program on the back of the Apple II computer in the 1980s, the early success of the Apple II in the business market was due largely to the existence of the VisiCalc program.

In many instances the linkages are financial as the large customer has a financial stake in the small company that is acting as its supplier or its distribution channel. Besides providing sound financial backing, such a ‘tie-up’ helps the small company keep informed of its customer’s or its supplier’s technical developments.

There are obvious risks in being so closely associated with one customer or, in the case of a service company, with one supplier. If the relationship goes wrong for whatever reason, or the OEM’s business starts to fail, the firm is extremely vulnerable. Chapter 4 identifies major contracts ‘going bad’ as one of the causes of failure of high-tech firms. The key to success, therefore, is diversifying the risk so as not to be too dependent on just one customer. Some of the small high-tech firms set up in response to the liberalization of the telecommunications industry in the UK which thrived on the back of equipment supply contracts for British Telecommunications (BT) found few other opportunities to diversify their customer base, as BT still had a near monopoly position in the UK market.
Developing appropriate distribution and selling

Direct selling by the company’s own salespeople is undoubtedly the most effective way of marketing high-tech industrial products. Where there are few potential customers because there are only a few OEMs, or the company is focusing on a very narrow market segment, this poses few problems – other than finding good technical salespeople. This is easier said than done since good technical selling skills are all too rare. Not surprisingly, the computer industry is prepared to allow its best salespeople to earn more than the chief executive, if they are any good. In making salesforce decisions, management all too often forget to go back to basics to analyze the purchasing behaviour of the customers and the nature of the sales task. Only if the nature of the sales task is clearly defined and competitors’ sales tactics have been analyzed can the right type of salesperson be recruited. Some products or services require the salesperson to act more like a technical consultant than a salesperson, while in other situations the task is primarily educational or involves more aggressive selling. In one biotechnology company selling semen, the traditional artificial insemination product, to the cattle breeding industry, the switch to embryo transfer caused immense selling problems. The company has found out through experience that a more technically sophisticated salesperson is required to sell embryos than semen.

Where the market is fragmented and difficult to reach effectively and economically, as when the typical sales value of a single transaction is small, firms must rely on distributors. Building up a good distributor network is one of the most difficult tasks facing a high-tech company, since technically sophisticated products and services do not easily lend themselves to indirect selling. Small companies in particular find it difficult to obtain ‘mind-share’ from established distributors unless they have a knockout product. Distributors’ salesforces tend to be order-takers for established high-volume lines. They rarely have the technical qualifications or obtain sufficient knowledge to see a high-tech product, and rely largely on product data sheets for their information.

Managing the marketing effort

In all but a few of the more successful computer hardware and software companies, marketing in the true sense of the word is sadly lacking. Few if any firms have sufficient information about their customers or competitors, and few undertake any marketing analysis. The marketing cultures of the larger high-tech firms such as IBM, Microsoft and Dell just do not exist. Instead, firms rely on the intuition of the entrepreneur or founding team to develop the right product innovation for which there happens to be a market. Subsequent success, however, always requires a clear view of the market. The special problems of high-tech firms relate to difficulties in identifying market segments as, unlike markets for
established products, there is often little extant market research available and little in the way of conceptual frameworks to guide bespoke research. Forecasts of market growth rates for high-tech products are notoriously over-optimistic.19

In a high-tech turnaround, time will be limited and the minimum for a practical marketing approach should involve:

- an analysis of customer buying behaviour;
- segmentation of the market by type of customer;
- an assessment of the size and growth rates of the major segments (customer segments as well as product segments);
- identification of competitors in each segment, their strategies and an analysis of their strengths and weaknesses;
- identification and assessment of the major trends in the market and what is driving those trends;
- a review (or audit) of the firm’s position in the marketplace.

**Speed to market**

The short window of opportunity characteristic of many high-tech sectors makes speed of market development of a new product a critical factor because, in all but a few situations, it is only a matter of time before competitors imitate or improve on the product. Licensing is one way of achieving this (see pages 46–8). The speedy commercialization of a new product immediately after launch is exceptionally difficult for small firms, particularly those lacking marketing skills. If the product is a radical innovation for which the market is ready, the judicious use of public relations in the trade press may create large demand quickly, although the downside of such quick market acceptance may be the firm’s inability to gear up manufacturing and meet delivery promises.

**COMPETITION**

What is the nature of competition for high-tech firms as they attempt to grow in their chosen product-market segments? Can young high-tech firms develop sustainable sources of competitive advantage to allow them to earn above-average profits (economic rents) against larger competitors when the market matures? These are key questions for the longer-term survival of most high-tech firms.

The major competitive risks for the typical high-tech firm are:

- product competition;
- price competition;
High-tech Turnaround

- marketing power;
- time-based competition;
- product standards.

**Product competition**

High-tech industries are characterized by short product life cycles and rapid innovation. Leapfrogging competitors with a superior product or imitating them with a me-too product are common forms of competition. Such competition may come from one small firm or from large players. A superior product based on superior design or technology is clearly a source of competitive advantage, but unless the firm can obtain good patent or copyright protection for its product the competitive advantage is rarely sustainable. Few firms can rely on continuous innovation to stay ahead of the competition over many years. The evidence from field interviews suggests that constantly repeating product success – as Dell and Intel do – is exceptionally difficult. In theory, patent or copyright protection should give the high-tech firm total protection against imitators. In practice, patents and copyrights provide only limited protection, and for most small high-tech firms none at all, since they do not have the financial or management resources to institute legal proceedings. Furthermore, with some technologies, such as vacuum technology, the technology is more of a ‘black art’ than a patentable product, making patent protection difficult or impossible, while for others, applying for patents is likely to alert competitors to future product moves or give them enough information to find ways around the patent. The issue of intellectual property rights is a big one for high-technology firms (but is beyond the scope of this book), not least as the time required to see a financial return on an investment in intellectual property rights or from a change in corporate policy regarding intellectual property rights is likely to be beyond the time within which a turnaround must be achieved.

Whether or not large players are attracted to compete in the market will depend on the potential size of the market and the stage of its development. Unless large companies decide to develop a market themselves based on proprietary core technology, they tend not to enter emerging markets, but wait until the market growth takes off. IBM’s decision to enter the personal computer market after Apple and other start-up companies had established that a market existed is a well-known case in point. To attract large players, the market potential does not always have to be that big, since the pressure for growth on large companies coupled with a realistic analysis of the forces driving competition in volume markets has caused many large firms to become niche players in their search for growth. In the world market for advanced mass spectrometry, for example, sectors with only about $50 million on a global basis are attracting major Japanese competitors. However, this
notwithstanding, the most attractive markets for smaller high-tech firms are still those which are too small to be of interest to larger competitors.

The ability of the small firm to compete successfully against product competition from large players depends on the nature of the technology and the depth of product customization required. In some high-tech sectors, particularly those selling large capital goods, technology tends to develop relatively slowly and size, \textit{per se}, does not determine the rate of product development. Furthermore, a high degree of customization is often required which makes the market less attractive to large players. The nature of technology may, however, change over time, often increasing in complexity and sophistication as large new players enter the market and substantially increase investment levels in technological development.

\section*{Price competition}

The entry of new players into any market brings about a battle for customers and market share. Increased competition and the inevitable slowdown in the market growth rate will lead to price competition and decreased margins. As new entrants arrive with me-too or only marginally improved products, the early innovative firms will lose their technological differentiation, becoming more commodity-like in their characteristics. At the same time, the customers’ bargaining power increases because they have more choice and become increasingly knowledgeable about purchasing the type of product in question. These forces reinforce each other, leading to more price competition and declining margins. At this stage, the high-tech firm has to develop a radical innovation to differentiate itself once again (which is likely to be very difficult) or try to defend its market share by becoming a low-cost competitor, or exit the market and refocus on new product-market segments.

Industries or market segments where competitive advantage is determined by cost leadership are a difficult environment for the typical high-tech firm whose initial success has been based on product innovation. Even in those few situations where the firm has been set up with the aim of becoming a high-volume, low-cost producer, low costs have not been sustainable as a source of competitive advantage. The case of Microvitec, the UK pioneer in colour monitors, is just such an example. Microvitec’s founder, Anthony Martinez, aimed to follow a cost leadership strategy but purchased his major component, cathode ray tubes, from Japanese television manufacturers. For three years the company was exceptionally successful, increasing sales from £200 000 in 1980 to £14 million in 1984. The company went public in 1984, but almost immediately the Japanese suppliers started to manufacture their own colour monitors at cost levels which were beyond the reach of Microvitec.\cite{24} In ‘volume’ businesses – those selling standard products in large quantities – the small firm is likely to lack the cost advantages that accrue from economies of scale and learning curve effects.
Where there are no significant cost advantages due to size, the high-tech firm still finds it exceedingly difficult to become a low-cost competitor. The difficulty arises because the efficiency necessary to be a low-cost producer is in conflict with the capabilities and conditions necessary for sustained product innovations. The culture of the business, the characteristics of the people employed, the leadership style and the organizational structure all need changing. Although senior management may understand the need for such changes, the implementation process is exceptionally difficult. Very few firms make the transition successfully since it involves abandoning the strengths on which the company grew and moving into unknown waters. Significant management and staff changes are necessary to accomplish the result. Those companies that have built highly successful growth businesses have typically dealt with the problem by trying to separate the underperforming company or division into two. This is standard practice in many large high-tech firms, including IBM, which (at least when one of the authors worked there) believed that setting up a competing or overlapping business unit was a more effective way to turn around an underperforming business unit than to attempt wholesale change of the underperforming unit, which instead would be left to ‘wither on the vine’. Such solutions, while correctly recognizing the need for separate cultures, run the risk of generating enormous conflict within the organization.

Marketing power

Even if the growing high-tech firm can hold its own against larger competitors in terms of product competition and costs, it may still find itself at a major competitive disadvantage in terms of marketing muscle. Large companies in the high-tech area, such as Cisco, typically have large sales and service networks. The smaller firm struggles and often fails to develop the critical mass in marketing necessary to compete against the larger competitor. The classic example is IBM’s entry into the PC market. The first generation of IBM PCs was recognized by industry experts as technologically inferior products to those of existing players, but the huge IBM sales and distribution network managed to capture the leading share of the US business market within a year of product launch. A more recent example of this phenomenon is Linux, recognized by most IT professionals as a superior operating system to Microsoft’s offering (for example in that it is far less prone to crashing – nor does it force the user to suffer the indignity of pressing ‘OK’ after every crash), but purveyors of Linux such as Red Hat have not yet made much progress towards displacing Microsoft from the corporate IT environment in G7 economies (there are other economies, for example Poland, where Linux has made much more progress against Microsoft). In practice this critical mass argument is usually somewhat commingled with the related but
different network effect (also known as economy of scope) argument, which is that for many technologies the value of the technology is partly derived from the number of other users of compatible technology. While large sales and distribution networks are important ingredients of marketing muscle, one should not forget the importance of service networks in the high-tech marketing mix. Service networks include not only the provision of spares and repair facilities but also installation and training of customers’ personnel. The lack of an appropriate service package is often a major competitive disadvantage for the small firm. Now that large competitors have started to realize that service is one of the sources of sustainable competitive advantage which is most difficult to imitate, small firms are going to have to become more innovative in their service delivery systems when competing against large players. Dell Computer Corporation has shown the type of innovation necessary with its telephone service operation, supported by Xerox Corporation’s field service engineers.

**Time-based competition**

Chapter 1 looked at how many high-tech markets are characterized by short product life cycles, leapfrogging and windows of opportunity that open and shut quickly. Time is, therefore, a critical competitive weapon since the firm with the shortest throughput time or response time stands to steal an advantage in the marketplace. Throughput time and response time are different concepts. Throughput time refers to the whole value delivery system: it is the time taken to take a new product from the beginning to the end of the new product development cycle, including market introduction. Response time is the time it takes to develop a new product in response to a competitor’s new product introduction. In strategic terms, a short throughput time can give first-mover advantages, while a quick response time provides the opportunity for second-mover advantages. Both can provide competitive advantage and, in theory, both options are open to high-tech firms, although the exact nature of the sector will determine whether first- or second-mover advantages are the greatest.

First-mover advantages typically provide competitive advantage where property rights (patents and copyrights) can be protected, buyer switching costs can be increased and critical assets can be pre-empted. Second-mover advantages can exist only in the absence of the three first-mover advantages. An example of a market where second-mover advantages appear to exist is the dynamic random access memory (DRAM) segment of the semiconductor industry. Entry barriers were generally low because competitors did not patent their products (or enforce their patents), large customers followed a policy of dual sourcing, and circuits were made from readily available silicon, often by third-party subcontractors. Firms manufacturing DRAMs that employed second-mover strategies, involving
rapid response to competitors’ first moves, were effective in gaining market share within the cycle of a single generation of products.\textsuperscript{30}

The vast majority of high-tech firms compete on the basis of second-mover advantages. They imitate quickly or make marginal improvements to existing products on the market, often relying heavily, as discussed earlier in this chapter, on external sources for their research and development. Speed of response is the basis of their competitive advantage, or lack of it their competitive disadvantage. Reliance on second-mover advantages always makes firms vulnerable to price competition since the technology is generally available to all competitors. However, firms that have implemented time-based strategies, such as Sun Microsystems, believe they have a defensible market position. One Sun executive is quoted as saying: ‘Copying something that moves faster than you can copy it isn’t a good business to be in.’\textsuperscript{31} Another comments:

\textbf{We wouldn’t hesitate to bring out a new product at a price and performance level that absolutely destroyed an existing line. Why should we wait for the competition to do it? That’s a brand new concept in this business and we’ve proved you can make money doing it.}\textsuperscript{32}

First-mover advantages are available to only a very few high-tech firms. A firm developing proprietary operating software, such as Microsoft’s operating systems for IBM-compatible PCs, is an example of a firm built on first-mover advantage. Fast-growth companies are often built on such advantages, as can be seen by looking at the history of Intel. Their ability to maintain their competitive advantage and continue growing is dependent on their ability to continue to implement prime-mover strategies, i.e. to develop a second and third generation of products which are radical innovations that are difficult to imitate. Research shows that small firms find this exceptionally difficult to do, since only rarely do small high-tech firms repeat their early success.\textsuperscript{33}

The extent to which large high-tech firms in need of a turnaround can succeed with a first-mover strategy depends on their ability to support the financial demands of such a strategy. IBM’s recovery under Lou Gerstner’s leadership is one of the biggest high-tech turnarounds in history. Gerstner’s turnaround of IBM made extensive use of first-mover advantages in several fundamental areas of technology, including copper-chip technology\textsuperscript{34} and the ultra-powerful Deep Blue\textsuperscript{35} chess-playing computer. In 1993, before Gerstner’s arrival, IBM had delivered to its shareholders the then largest ever loss in history at $8 billion – clearly Big Blue was in big trouble, though in fact in even bigger trouble than the accounts showed. In 1992, for example, on the way to its nadir, IBM had created an extra $2 billion on the balance sheet simply by changing accounting policy, and such policies masked the true extent of the company’s problems. But even at its nadir in 1993, IBM still...
had almost $8 billion of cash in its balance sheet, revenue of $62 billion, and one of the strongest brand names in the world. Gerstner took the helm in 1993, when IBM’s performance was at its worst ever, and by 1995 there was solid evidence that he had achieved a turnaround (see Figures 2.1 and 2.2).

**Fig. 2.1** IBM’s overall profit trend (1991–95)

**Fig. 2.2** IBM’s net cash and returns as per cent of capital employed (1991–95)
These factors gave Lou Gerstner considerable latitude in formulating and implementing a recovery strategy, factors that will be available to only a few high-tech turnarounds. Nonetheless, whatever its size, the high-tech turnaround should be relatively well placed to develop defensible time-based strategies since, in theory, these firms will lack bureaucracy and management will be experienced in operating in the fast-moving environment characteristics of a turnaround. In practice, success will depend on the ability of the management to implement such strategies as the firm experiences rapid growth.

**Product standards**

Small firms producing a product which requires compatibility with complementary goods and services may find that any initial success is quickly eroded by more powerful firms that adopt a strategy for having their product accepted as the industry standard. Strategies for winning standards battles involve establishing a large installed base of both core and complementary goods faster than competing standards and establishing the credibility of that standard. Such a strategy requires not only a proven product but also the financial resources to invest in distribution, manufacturing capability, maintenance support and marketing awareness programmes. A strong brand image and the ability to attract the support of third-party suppliers of complementary products can also help establish a product as the standard, as was the case when IBM established its PC as the industry standard. Few small high-tech firms have the resources to fight such a battle. Apple Computer’s continuing maintenance of its own standard in the face of the ‘Wintel’ (i.e. Microsoft Windows and Intel) standard during the 1990s was very much the exception rather than the rule. The Linux operating system, mentioned above, may prove to be an exception in the 2000s.

**PARTNERING STRATEGIES FOR PRODUCT-MARKET DEVELOPMENT**

Strategic alliances in various forms are common in technology-based industries. On the face of it, co-operation ought to be an effective means of compensating for deficiencies in resources, skills, technology and market access which are so common to many high-tech firms. There are many forms of co-operation, ranging from equity shareholdings and joint ventures to cross-licensing and more specific areas of functional co-operation. The typical alliance involves one firm providing the technology, while the larger partner provides marketing, manufacturing or financial resources.
The narrow and specialized skill base of many high-tech firms means that firms often lack the marketing and other management skills necessary for effective product commercialization.39 Couple this with a lack of financial resources and the fact that there may be a very short-lived window of opportunity before severe competition begins, and one can see why the external exploitation of the firm’s technology through partnering can sometimes be the best route to market development. Having one’s product marketed by other organizations via licensing or some other agreement requires few resources, minimizes risk and allows for a wider exploitation of the technology than may otherwise be possible. However, outward licensing tends to be used most commonly as a marginal strategy to exploit market segments or product applications peripheral to the firm’s core business area. The danger of extensive licensing is that it forces the firm to become a research and development laboratory without access to the needs of the market, and to become totally dependent for its own success on the success of other organizations.

One company that is using partnering as a central strategy for achieving a high-tech turnaround is Corel Corporation, based in Ottawa, Canada. Corel achieved only flat or declining revenues from 1996 to 2001, with sales falling from $334 million in 1996 to $157 million in 2000.40 As part of its attempt at turnaround, in 1997 Corel took a significant step when it received a cash infusion of $135 million from Microsoft by way of a non-voting convertible preference share issue (equivalent to a 36 per cent stake in Corel). Corel deepened its relationship with Microsoft in 2000 when it formed an alliance to collaborate on projects in Microsoft’s ‘dot net’ initiative. The partnership will include joint product launches, a common Internet presence and joint appearances at trade shows. Industry commentators see the effect of Corel’s partnering with Microsoft as being to ‘restore its credibility’.41

What are the typical problems that arise for the high-tech firm? Among the most important are:42

- loss of control over key aspects of the business which conflicts with the entrepreneur’s inclination for control;
- lack of bargaining power against the larger partner and therefore inability to capture value for its own innovations;
- dependency on a more powerful partner for its success;
- lack of management skills and resources to deal effectively with the complexities associated with managing inter-firm alliances;
- distancing of the firm’s development engineers from the marketplace;
- premature exposure of proprietary technology.

There are clearly enormous risks for the typical small- to medium-sized high-tech firm entering partnership arrangements. How can such a high-tech firm protect
itself from the obvious dangers? Firms that have developed successful partnering strategies have the following characteristics:

■ management with commercial experience in negotiating partnership arrangements;
■ a concerted effort to diversify quickly their risk of dependency on a single partner – it is much easier to diversify when markets are growing very fast and while the company’s principal products still have a clear competitive advantage;
■ continuing technological leadership to maintain proprietary technological advantages, thereby maximizing imitation costs wherever possible;
■ product and service support to the partner which is second to none – this ‘buys’ partner loyalty and increases switching costs.

Where partners are of very different sizes, the smaller partner always has to look for ways to ensure that the partnership is of mutual benefit to both sides over the long term. In the short term, rapid growth may occur, which is obviously good news for the smaller company, but such a situation can soon swing to the advantage of the larger partner when the technology matures and there are more sources of supply in the marketplace. Maintaining technological leadership is absolutely key for the smaller firm. Three approaches which firms might consider using to strengthen their position in any strategic alliance are:

1 the development of multitechnology-based systems (described earlier);
2 the pursuit of joint research and development with their partners;
3 allowing partners to have a minority equity stake in their business.

Joint R&D again involves some risk in that it may involve sharing (or trading) some proprietary know-how, but it has the potential advantage of developing a more stable, long-term relationship with the partner. The same argument applies to equity investments by larger partners.

**SUMMARY**

This chapter has discussed how the high-tech firm needs to build product development and marketing capabilities to improve its chance of corporate success. Six factors which determine the success of new product development activities were identified. They were:

1 orientation to customers’ needs;
2 emphasis on strong technical superiority;
3 involvement of the entrepreneur;
Most high-tech firms underestimate the costs required to establish their firm and their products in new chosen market segments – this in itself can be sufficient to put the firm into a turnaround situation. Six critical issues were discussed:

1. Building and maintaining credibility.
2. Building market differentiation.
3. Linking with large customers.
4. Developing appropriate distribution and selling.
5. Managing the marketing effort.
6. Speed to market.

The high-tech firm is always vulnerable to competition from smaller companies with innovative ideas and people who think differently – IBM’s failure to see Microsoft as competition being the classic example, which led to IBM entering a turnaround phase as described in this chapter. However, if managed well, the high-tech firm is potentially capable of competing against product and time-based competition, and recovery through a well-executed turnaround can deliver a vibrant and fully restored business – IBM again being a classic example. The inherent resource constraints of the most high-tech firms mean that collaborative or partnering strategies with competitors, customers and suppliers are quite common in high-tech turnarounds.

Notes
9 Sculley, J. and Byrne, J., op. cit., p. 83.
12 Nokes, S.M., personal correspondence.
17 Nokes, S.M., personal correspondence.
26 That is, most IT professionals who can be said to be free of any interest in Microsoft.
37 Ibid. – adapted.
The problem of managing growth

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The fast growth potential of many high-tech firms is one of the most exciting aspects of this type of company. Such phenomenal growth is a supreme challenge to management, because it makes the firm extremely fragile unless the way the firm is managed changes as the organization grows.

This chapter explores the typical problems that high-tech firms experience when they go through periods of rapid growth, and some of the approaches used by those companies which have managed growth successfully. All high-tech firms experience major problems as they move from a small, entrepreneurial organization to a larger, more professionally managed one. Some cope with the problems better than others, but no firm is exempt, since growth means that firms are constantly outgrowing their capabilities, which can easily lead to a management crisis and poor financial performance.

All chief executives who have experienced periods of rapid growth acknowledge the difficulties of the management challenge. Dell was of the fastest growing computer hardware manufacturers ever seen; Michael Dell founded the business with less than $1000 and then led it to a market capitalization of over $50 billion. But he is only too aware of the problems of sustaining profitability and high levels of growth in a fiercely competitive high-tech market:

> My view is that if we try to do [too much] ourselves, we would have a very slow ramp into those businesses and find ourselves learning a bunch of things that we might not necessarily be great at ... There are parts of our business where [Dell is] extending into things that, by themselves, are not massive opportunities today. But clearly they’ll develop into large opportunities, such as services.¹

Dell overtook Compaq as the leading supplier of PCs in the 1990s, but not because Compaq’s leadership had underestimated the problems that a firm faces during a period of growth. Rod Canion of Compaq felt there were some potential benefits: ‘If you’re growing slowly, problems can sidle up on you almost unnoticed. With high growth, if you don’t get out of the way first they knock you flat.’²

While some firms cope with the problems of growth better than others, there is no magic formula for success. When Scott McNealy, chief executive of Sun Microsystems, was asked how he managed fast growth, his response was: ‘Look, the most difficult things to do when you’re running a fast-growth company are getting enough sleep, thinking clearly, having the courage to make tough decisions, being lucky and working harder than anyone else. There’s no magic to it.’³

This chapter discusses stages of growth, typical growth problems, loss of excitement, the standard recipe – introducing professional management – the need for stability and flexibility, successful growth and when growth stops or slows.
STAGES OF GROWTH

Conventional wisdom about growth and the firm tends to concentrate on a ‘stage’ model of growth. The firm is seen as passing through a sequence of growth stages (the number varies from model to model), with a discussion of what the dominant features within the firm are at each stage and also what factors need to change in order for the firm to make the transition from one stage to another. All the models portray the firm as a behavioural entity whose focus of activities changes in systematic and predictable ways. These models have added to our understanding of growth and the effect it has on organizations, but the reader should be aware that in practice the stages are not discrete but are somewhat fluid, with problems overlapping in adjacent stages, and that there is no inevitable linear sequence of stages as the firm moves from one stage of development to the next.4

In better performing firms, growth is managed as a process of steady evolution. The culture at Arena Pharmaceuticals, for example, evolved gradually as the company grew. The management team continued to be young, laid-back, hard-working and informal. Interviewed in 2001, Jack Lief, CEO, did not feel that culture change was a problem:

Aside from the technology aspect of Arena Pharmaceuticals, which I think is outstanding, there is a corporate culture aspect. I’ve always been amazed at how smaller companies have been able to discover things and be productive, if they are run well, and how those same companies lose that ability when they grow up and become larger organizations. This gave me the opportunity of putting into play some of my theories on how to prevent that from occurring and how to keep organizations productive.5

The best-known growth model is Greiner’s five-stage model, shown in Figure 3.1, which sees the growth of organizations as a series of evolutions and revolutions precipitated by various crises.6 The first two stages are interspersed by the classic crisis of leadership where the founders have to accept the need for delegation of authority and be flexible enough to alter their position within the company to allow non-founder managers to operate effectively.

More applicable to the small firm are the models developed by Churchill and Lewis, Flamholz, and Kazanjian. The Churchill and Lewis model (shown in Figure 3.2) concentrates on the earlier stages of growth and identifies the company as passing through a series of problems, from getting customers and ensuring the delivery of the product in the start-up stage, through cash crisis as the company grows, to problems of consolidation as the company matures.7

The model adjusts for increasing complexity of operations as the company grows, and also allows for changes in strategies that can cause companies to loop
back through the stages. Applying the model to high-growth companies, it assumes that companies will jump rapidly through the stages and, as a result, the ‘forced evolution’ will cause a mismatch between the organization and the needs of the business.

**Fig. 3.1** Greiner’s five-stage growth model

<table>
<thead>
<tr>
<th>Size of organization</th>
<th>Phase 1</th>
<th>Phase 2</th>
<th>Phase 3</th>
<th>Phase 4</th>
<th>Phase 5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Large</td>
<td>Crisis of autonomy</td>
<td>Crisis of control</td>
<td>Crisis of growth control</td>
<td>Growth through delegation</td>
<td>Crisis of ?</td>
</tr>
<tr>
<td>Small</td>
<td>Growth through direction</td>
<td>Growth through delegation</td>
<td>Growth through collaboration</td>
<td>Growth through co-ordination</td>
<td></td>
</tr>
</tbody>
</table>

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The Flamholz model, which was developed specifically to help manage the transition from an entrepreneurial to a professionally managed firm, identifies four stages of growth:

1. new ventures;
2. expansion;
3 professionalization;
4 consolidation.

**Fig. 3.2** Small business growth model

The key transition is from stage 2 to stage 3 because it is at this time that growing pains emerge. The exact point at which this occurs will vary from firm to firm depending on the industry, the complexity of the firm’s product-market strategy and the capabilities of its entrepreneurial top management team. There is some evidence, however, that the sales volume threshold at which technology-based firms experience growing pains is considerably higher than for low-technology companies. A focused product line with a few distinct market segments reduces complexity and allows the firm to grow relatively large before experiencing severe
The problem of managing growth growing pains. Likewise, a highly capable chief executive (or top management team) can extend the point at which crisis occurs. However, there is a danger that postponing the crisis, and continuing to run a relatively large company as though it were a small company, only causes an even bigger crisis eventually.

The Flamholz model is very similar to that used by Scott and Bruce, and Kazanjian when he analyzed the relation of dominant problems to the stages of growth in 105 technology-based new ventures. Kazanjian’s four stages and the dominant problems at each stage are summarized in Figure 3.3. Not surprisingly, new product or technology applications dominate stage 1 (the development phase) and acquiring resources dominates stage 2 (the commercialization phase). Up to this point the organization is small, informal and dominated by its founders, and probably has less than about 40 employees. Some discrete organizational units are probably beginning to emerge. If the firm is successful in the marketplace and moves into a period of high growth, the major problem facing management is to organize the firm in such a way as to be able to sell, produce and distribute its products in volume at a profit.

Not surprisingly, it is at this stage that building an efficient and effective organization takes on increased importance. It is the problems that emerge in building such an organization quickly that are the focus of this chapter.
TYPICAL GROWTH PROBLEMS

Growing pains emerge when the high-tech firm’s growth outstrips its organizational and administrative resources. Growing pains are unavoidable, so management must recognize the nature of the problem and act accordingly. The degree of organizational change that is necessary to solve growth problems is often considerable and painful for those involved.

In analyzing any set of business problems – and growth problems are no exception – management should always seek to separate out the symptoms from the causes. Treatment of the symptoms alone will not cure the 'patient' unless the underlying causes are also dealt with in an appropriate manner. Many of the most common growth problems are the same for fast-growing high-tech firms as for any entrepreneurial firm experiencing rapid growth. However, the fragility of the young high-tech firm exacerbates the effect of many of the problems, thereby further increasing fragility. Not surprisingly, therefore, rapid growth is a time of increasing risk for the organization, even though the financial community may be identifying the company as a star performer.

Problems associated with growth usually show up first as symptoms. Familiar symptoms in high-growth high-tech firms include:

- confusion about ‘what my role in the company is, particularly at management level’;
- a permanent feeling of crisis: constantly ‘putting out fires’ and ‘chasing my tail’;
- long working hours but ‘never enough time to get things done’;
- interdepartmental bickering and even warfare;
- increased feeling of job insecurity;
- meetings felt to be a waste of time;
- lack of co-ordination between different parts of the organization;
- key people, particularly technical staff, leave the firm;
- cohesiveness and ‘employee spirit’ declines;
- decisions delayed or do not get taken because they fall between two departments;
- managers begin to design and maintain their own control systems because the corporate system does not provide adequate information;
- lack of perceived direction;
- friendly or exciting atmosphere starts to disappear: firm becomes impersonal.

These and other similar symptoms lead to frustration, stress, poor decision making and declining morale which in turn lead to declining firm performance. It is not always easy to distinguish between causes and symptoms since organizational cause and effect relationships are usually complex and difficult to disentangle.
However, failure to analyze the organizational and administrative problems that emerge during rapid growth, identify the causes and take appropriate action will inevitably lead to a slow-down in growth and possible crisis.

Most of the organizational problems that technology-based firms incur when they grow rapidly are common to non-high-tech situations as well.\(^ {11} \) There are seven principal problems:

1. The inability of the chief executive to change his or her role.
2. Jobs outgrow the people.
3. Communication becomes more difficult as the number of intracompany relationships increases.
4. Inability to maintain the ‘team spirit’ and cohesiveness of the small firm.
5. Breakdown in decision making as demand increases.
6. Role confusion among top management.
7. Resource shortages leading to stress and burnout.

Figure 3.4 summarizes the typical growth problems, each of which is reviewed briefly below.

**Fig. 3.4 Typical growth problems**

<table>
<thead>
<tr>
<th>Typical growth problems</th>
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<tbody>
<tr>
<td>Inability of CEO to change role</td>
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<tr>
<td>Jobs outgrow the people</td>
</tr>
<tr>
<td>Communication difficulties</td>
</tr>
<tr>
<td>Inability to maintain team spirit</td>
</tr>
<tr>
<td>Breakdown in decision making</td>
</tr>
<tr>
<td>Role confusion</td>
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<tr>
<td>Resource shortages</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Resulting in</th>
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<tbody>
<tr>
<td>Key people leaving</td>
</tr>
<tr>
<td>Interdepartmental conflict</td>
</tr>
<tr>
<td>Focus on short-term operational problems</td>
</tr>
<tr>
<td>Low morale</td>
</tr>
<tr>
<td>Stress leading to absenteeism</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Ultimate effect</th>
</tr>
</thead>
<tbody>
<tr>
<td>Declining productivity</td>
</tr>
<tr>
<td>Poor performance</td>
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</tbody>
</table>
Inability of the chief executive to change role

As the firm grows, the nature of the chief executive’s role needs to change from one of ‘doing’ to one of ‘managing’. Typically this involves delegating certain tasks which the chief executive did him/herself before rapid growth began; yet for most chief executives of high-tech firms, particularly if they are the founder or owner, this transition is difficult to make. The need to change from a ‘doing’ to a managing role means more than just delegating tasks and some decision making. It often calls for a substantial change in priorities – spending more time on planning and control, and perhaps more time with investors if the firm has gone public, and less time on operations.

Problems of this nature may arise due to either a lack of capability on the part of the chief executive to play a different role, or from his or her unwillingness to change role. In high-tech firms, lack of capability to take on a different role is most acute among technical entrepreneurs who have neither the business experience nor the management skills to run a medium-sized business. In some instances lack of capabilities may be linked to an unwillingness to change since the chief executive knows his or her limitations. However, a common problem among high-tech firms is an unwillingness among the chief executive and other senior managers to delegate. The reasons given include:

- a fear of breaking up the tight-knit team that has been a cause of the firm’s success to date;
- a fear of losing control: inexperienced managers often equate delegation with loss of control, which, of course, it need not be if adequate control systems are in place;
- a belief that middle management is not ready to handle ever increasing responsibilities.

Jobs outgrow the people

Rapid growth usually leads to employees at all levels – but particularly key managers – being unable to change as rapidly as the demands of their jobs. Not all managers are capable of handling increased responsibility. Skill shortages are likely to exist and attitudes and behaviour may need to change if existing employees are to meet the expanding demands of their roles.

One problem unique to the growing high-tech firm is that some of the company’s most innovative staff may be attracted to managerial work by the prestige and rewards accorded to management positions, yet it may be work for which they are not ideally suited. In this situation, the firm gets the worst of both worlds – poor managers and loss of key technical talent.
Management in growing firms are often hesitant to handle situations where managers are obviously out of their depth. Very often it is members of the ‘founding team’ (one or more of the founders or the early employees) who are causing a problem. In such situations, the chief executive or another senior executive responsible feels a strong sense of loyalty and gratitude for past services rendered by the individual. In young firms the problem is often complicated by the fact that the founding team may be personal friends of long standing.

**Communication becomes more difficult**

As firms experience rapid growth, the number of intracompany relationships increases, making communications more and more complex. Informal face-to-face communications which are the norm in small firms become more difficult and are replaced by written reports. Even firms with a relatively narrow product line will experience problems as multiple locations and physical distances between work groups increase even on the same site.

**Inability to maintain team spirit and cohesiveness**

Young high-tech firms are characterized by informal structures and cultures and a ‘hands-on’ top management style. As the firm grows it becomes increasingly difficult to maintain the team spirit, because the number of personal relationships to be managed increases even more than the number of employees. The more relationships there are to manage, the more scope there is for distrust, suspicion, bad feelings and misunderstandings, which leads not only to poor implementation but also to slow decision making and declining morale. These problems are exacerbated when new levels of management are added (distancing the employees from top management).

It is not just the size and scope of the company’s operations that may cause team spirit to decline. Growth often generates considerable internal tension among the founders or within the top management team due to differences in the capability and/or willingness of the individuals to adapt to the changing conditions.

**Breakdown in decision making**

Growth often causes a breakdown in the decision-making processes that worked when the company was smaller. When problems and issues arise in small firms, decisions can be made on the result of face-to-face discussion using informal methods of communication. Beyond a certain size, top management cannot cope with the volume of decisions required, so inevitably many decisions are neglected and avoided or made in a haphazard way, or at best severely delayed. Chapter 1
explained why speed of decision making is critical for the small high-tech firm. Growth makes it an even more important issue since the faster the growth, the greater the number of decisions that have to be taken rapidly. The need for so many decisions to be made quickly is often beyond the intellectual or emotional capabilities of many managers, particularly those with a technical background who may have an analytical (and sometimes academic) bias towards extensive analysis and discussion.

Role confusion

As new employees are added, particularly at managerial levels, to cope with the growth in demand, confusion about roles, authority levels and responsibilities sets in. Confusion leads to demotivation and very often to a breakdown in decision making. When few senior people are sure of the answer to the question ‘Who has responsibility for …’, then confusion exists. What is worse is the impact that such confusion has further down the organization. Confusion at senior management levels is always transparent to those further down the organization.

Resource shortages

Shortages of experienced senior staff, both managerial and technical, are nearly always a feature of high-growth situations. Large numbers of new people need to be recruited and trained quickly, but only rarely do firms find they can manage this. The problem is often worse for high-tech firms, particularly the more innovative ones, because they frequently require specialist technical talents which have hitherto not existed. Firms want their new employees to be productive quickly, but very often the pressure to recruit is so overwhelming that insufficient efforts are made to train and assimilate new staff. The result is very often poorly trained and motivated staff which leads to eventual product quality problems and high costs due to inefficiency. The constant shortage of resources puts enormous pressures on the existing, more experienced employees. The likely effects of such pressures are burnout or focus on those activities which are obviously urgent. Tasks such as training, the development of new operational systems and planning are ignored in favour of keeping pace with current demand.

Resource shortages show up not just in the form of people problems but also in areas such as physical facilities and systems. Fast-growth firms typically outgrow their phone systems, their management information systems, their recruitment and training systems, their customer support systems; in short, everything that comprises the infrastructure of the firm.
The problem of managing growth

LOSS OF EXCITEMENT

Garden’s more detailed study of job excitement and motivation in the software industry (discussed in Chapter 6) indicates that, with only a few exceptions, the spirit of excitement felt by employees is significantly lower in larger firms than in smaller firms. The few exceptions are those firms that have found ways of not losing this spirit as the firm grows into a larger, more established organization. Garden found that not all the organizational variables associated with job excitement and satisfaction differed with the size of the firm. However, three variables which showed a significant or highly significant relationship with job excitement showed a noticeable decline as the size of the firm increased, and some of the key factors associated with satisfaction increased significantly with size. Table 3.1 summarizes the key variables which appear to change with size. Noticeable change in the variables occurs when the firms are still at a fairly early stage of their growth. Garden’s study found significant differences in employee attitude between three cluster sizes of small firms: those averaging 45 employees, 89 employees and 205 employees. While these categories were chosen arbitrarily, the findings are consistent with case study evidence in many high-tech firms.

Table 3.1 Organization variables showing significant change as size of firm increases

<table>
<thead>
<tr>
<th>Excitement variables decreasing with size</th>
<th>Satisfaction variables increasing with size</th>
</tr>
</thead>
<tbody>
<tr>
<td>Awareness of making contribution to success of the firm</td>
<td>Education, training opportunities</td>
</tr>
<tr>
<td>Ability to achieve something useful</td>
<td>Sufficient resources</td>
</tr>
<tr>
<td>Able to make full use of own skills</td>
<td>Adequate security</td>
</tr>
</tbody>
</table>


The growth of LAN Systems (name changed to preserve confidentiality), a local area network company, provides one such example. The firm was founded in 1984 by John Andersen, a 26-year-old MBA graduate of the Wharton School, who had a vision of what the office of the future might look like. He brought in two co-directors of a similar age both with PhDs in computer science who were then undertaking research at a prestigious university. The business started in John’s house, with the directors working together in the same room developing the first product and undertaking some consultancy work to cover overheads. As the first product emerged, they moved into a small office and recruited about six staff. The
High-tech Turnarounds

atmosphere was extremely congenial and friendly, everybody understood the targets and the newly hired staff soon shared the values, enthusiasm and commitment of the founders. Subsequently the founders referred to this group as the core group.

With the successful launch of the first product into a still emerging market segment, the company grew quite quickly to about 40–50 employees without losing the small and friendly atmosphere that had started in John’s sitting room. The core group easily passed on their values and objectives to the new recruits. Everyone worked long hours and was dedicated to the success of the firm. At about this time John and his co-directors developed a typical functional organization structure and began to appoint a supervisory layer of management underneath themselves.

As the business continued to grow to about 75 employees, John noticed that the newer recruits appeared not to work as hard as the original team and were much less interested in the success of the business. At the same time new senior managers were brought into the finance and sales functions and friction started to develop between John and the other founders. All three founders were perfectionists with no industrial experience prior to starting LAN Systems. They grew highly critical of each other, and John’s co-directors became dissatisfied with his autocratic style and lack of people-management skills. John, on the other hand, who spent most of his time on strategy, was increasingly frustrated by what he saw as a lack of business awareness among his fellow directors and a lack of commitment by the employees, both those recently recruited and some of the earlier hires. It was quite clear that the early spirit of excitement had disappeared.

What is interesting in the LAN Systems example is the way in which the recruitment of successive waves of employees impacted the organization. The founders and ‘core’ employees were clearly highly motivated and managed to engender a reasonable degree of enthusiasm as the firm expanded to about 40 employees. Beyond that size, the firm found it increasingly difficult to maintain an exciting work environment, and by the time it had 60–75 employees it was experiencing severe growth pains. This situation is not atypical. Many small high-tech firms appear to exhibit severe management problems as they hit the 50–75 employee barrier. This is the transition period when the firm is typically trying to move from becoming a small entrepreneurial venture to a more ‘professionally’ managed organization. The key at this stage is to introduce a more professional approach to management without losing the excitement which is important to innovation and building a winning culture.

Less obvious, but something which can be seen in some high-tech firms, is another transition point when the firm reaches about 150 employees. At around this size it becomes difficult for the founder(s) to hire and know all the employees individually and to maintain an environment which motivates innovative technical
employees. Beyond this stage management find it difficult to be ‘hands-on’ and often develop a more indirect method of managing through structure, systems and cultural values, more typical of a large established firm.

The loss of excitement as the firm grows is due partly to the size factor and the changing patterns of social interaction within the firm, and partly to the characteristics of employees who are attracted to firms of different size (see Figure 3.5). As with many situations, the cause and effects flow in each direction and management can set up a virtuous or a vicious cycle. If the firm manages to retain an ‘exciting’ culture as it grows, its chance of attracting high-quality recruits will be good. This will lead to the development of a high-performance culture which provides the right environment for sustained growth. If, on the other hand, management allows the type of situation described at LAN Systems to develop, a vicious circle ensues and key employees leave. This has the effect of increasing fragility at what is likely to be a difficult period of transition even if managed well.

**Fig. 3.5 Impact of growth on employee commitment**

Before discussing the various options used by high-performing growth firms to avoid loss of excitement, we need to understand how the standard recipe for dealing with growth – the introduction of professional management – is likely to accelerate the loss of excitement.
THE STANDARD RECIPE

The traditional approach, or 'standard recipe', for dealing with the many management problems that arise from rapid growth is to introduce professional management. Both academics and practitioners talk about how growing firms need to make the transition from entrepreneurial to professional management. (This broadly equates to the first crisis in Greiner’s model shown in Figure 3.1.) What this means is not always clear, although there are two features which tend to differentiate entrepreneurial from professional management:

1. the degree to which decision making is delegated;
2. the degree of formality built into procedures, policies and control systems.

The introduction of professional management practices involves the delegation of some decision-making responsibility from the chief executive/owner-manager to a group of middle managers on the basis that one-man rule becomes increasingly difficult and ineffective when the firm reaches a certain size. Second, it involves the use of more formal systems for planning and controlling the activities of the business. The need for more formal systems and procedures is in part due to the delegation process. Systems are needed to guide and evaluate the performance of middle management, but the need also arises due to the increasing volume of transactions that accompany growth.

The systems and procedures that firms install as they ‘professionalize’ can be thought of as operational systems and management systems. Operational systems are the basic systems which every firm needs to function – to facilitate sales, order processing, inventory, purchasing, production, delivery, billing and collection as well as for basic accounting. Without such systems the firm is unable to meet its customers’ needs. With growth, firms soon outgrow their existing systems. A continual process of upgrading systems is needed which usually involves the firm acquiring new managerial capabilities from outside. Management systems, on the other hand, are those geared to the general management tasks of planning, organizing and controlling the firm’s development. Typical management systems include strategic and operational planning systems, organizational systems (appraisal systems, management development systems, etc.) and control systems (budgeting, objective setting, etc.). Formal management systems tend to be introduced when the firm reaches such a size that the original entrepreneur or chief executive can no longer be involved in all aspects of the business. The point at which this is reached depends on the capabilities and work capacity of the chief executive and the complexity of the firm’s business activities.

In theory, professional management as defined above – whether introduced by hiring a new chief executive or by the chief executive changing his or her management approach – should help the growing firm. After all, delegation
should allow the firm to remain innovative and adaptive to its environment by pushing decision making down closer to the customers and suppliers, and more formal controls should promote greater efficiency. In practice, however, the introduction of professional management causes its own set of problems, often more serious than the problems they were intended to solve. The typical problems that fall into this category are:

- hiring new ‘professional’ managers;
- the introduction of new levels of management;
- the introduction and growth of functional specialisms;
- the development of structural rigidities leading to poor implementation;
- the negative aspects of formal management systems.

These problems are sufficiently common among growing technology-based firms that each is discussed below separately.

**Hiring new professional managers**

Bringing so-called ‘professional’ managers into growing technology-based firms is fraught with risk. While no statistics are available, the failure rate is very high. The problem starts with the recruitment process. Insufficient attention is given to defining the job and the type of person required. Many firms experiencing growth problems believe that they should professionalize by recruiting an individual with management experience in a large firm. This is a potential recipe for disaster, since it equates, quite wrongly, large firms with professionalism. The opposite is often true, even in technology-based industries.

Once new managers have been recruited – often into financial and marketing positions – the problem becomes one of fit. The organizational culture and operating style of fast-growing companies are usually very different from the environments where these individuals have been employed previously. They find it difficult to adapt and to work as part of the management team. Furthermore, an individual who is a good manager in a traditional organization is often no good at managing the type of people attracted to high-growth high-tech firms: managers from large organizations with a strong need for power are often in conflict with the employee who desires autonomy and a degree of independence. Nobody ‘speaks their language’ or understands their approach to business or seems interested in learning about it. They wonder why they were hired in the first place, become frustrated and leave. The blame for the lack of fit can lie either with the existing management team or with the new recruits. Many entrepreneurs complain that they fail to see (although they want to) how professional managers add value and are perplexed as to how they spend their time. What concerns them
most is the inability of many of these (professional) managers to understand the business and ‘make things happen’.

New levels of management

Delegation invariably means adding a new layer of management and the start of a management hierarchy. As the firm goes through the 50–75 employee transition phase and beyond, a cadre of managers reporting to the board develops: the ‘dreaded’ middle managers. If promoted from within, middle managers in growing high-tech firms usually lack adequate managerial skills, while if brought in from the outside, middle managers have all the problems discussed above. Too often middle management act as blockages to good communications within the firm. At Apple Computer, founder Steve Jobs commented:

> Polaroid and Xerox [used to be] have been on everyone’s list of the ten best-managed companies. How did they lose their way when they became multi-billion-dollar corporations? When you start growing like that, you start adding middle management like crazy.

> … People in the middle have no understanding of the business and, because of that, they screw up communications. To them, it’s just a job. The corporation ends up with mediocre people that form a layer of concrete.

> We’re trying to keep Apple as flat as possible.13

Top management’s natural reaction to this problem is to bypass the middle management layer, particularly in owner-managed firms. The time pressures brought about by growth rarely allow top management the time to work with the new middle management to generate a new style of management. Where new managers are recruited from outside the firm, an additional problem arises: the alienation of subordinates. Employees who previously had direct access to senior management perceive themselves to be demoted, which in turn may lead to declining morale and the loss of some key employees.

Introduction and growth of functional specialisms

Professionalization of management also brings with it the addition of technical experts and various staff specialists (e.g. human resource professionals, IT specialists, marketing planners, etc.). Typically the newcomers are required to provide the skill base to allow the firm to grow and to maintain technological competitive advantage. Even though new staff are often brought in to bolster existing management, employees feel threatened. The problem usually involves a mutual lack of understanding between the old and new guards, a situation which
is aggravated when new employees try to ‘take over’. As senior management add new staff positions to provide support for line management, it becomes increasingly difficult to see how the staff specialists add value for the customer. In many cases they subtract value by interfering (to justify their existence) and by slowing down decision making.

Development of structural rigidities

Organization charts are not generally a feature of small companies but growth soon brings pressure to formalize structure. Departments quickly stake out their territory and build walls around themselves. So-called professionalization tends to encourage such behaviour and inevitably leads to a breakdown in the all-important cross-functional linkages. The end result is slow decision making and poor implementation.

Negative aspects of formal management systems

Perhaps the greatest danger of professionalization is the effect formal management systems have on innovation and entrepreneurship. Innovative product development and marketing is the life blood of successful fast-growth technology-based firms, yet time and time again professional managers introduce inappropriate management systems in a desire to improve operating effectiveness. Whereas effective operational systems are a prerequisite for managing growth, the introduction of ‘professional’ management systems (described above) may change the culture of the firm on which its early success has been dependent. Formal management systems can very quickly become bureaucratic processes which stifle initiative, slow down decision making and make the firm less responsive to customers’ needs. On top of this, the cost of running the systems often outweighs the benefits.

In addition to the problems brought about by the professionalization process itself, some of the problems caused by growth – role confusion, resource shortages, communication problems, etc. – may persist, making the effort to professionalize all the more difficult. A vicious downward spiral can quickly develop whereby stress increases and morale declines. In the very short term this may be offset by the euphoria often associated with rapid growth, but it increases the fragility of the firm, making it more vulnerable to single events which trigger decline (see Chapter 4).

FLEXIBILITY AND STABILITY

How do firms cope with the rapid growth and the issues highlighted above? Most muddle through and learn by their mistakes. Few have the capacity to think about their organization analytically. Most are searching for a simple solution to what is,
in fact, an extremely complex business problem of managing change. Managing the requirement for rapid change while providing continuity has been identified as the central dilemma facing high-tech firms.  

As shown above, rapid growth leads to significant instability in the organization, due to the constant need to reorganize to meet the operational requirements of the business. This would tend to indicate that the organization requires some form of stability, but too much stability will lead to a loss of one of the small firm’s greatest assets: its flexibility. Nowhere is the dilemma between the need for stability and the need for flexibility greater than during the growth of high-tech firms. However, the requirements of flexibility and stability are mutually exclusive: the attainment of one is always at the expense of the other. Flexibility implies openness to change, adaptability and freedom from rigidity, while stability implies routine desire to preserve past wisdom and resistance to change.

Flexibility is clearly required to enable the firm to modify its existing practices as it grows in an environment where product life cycles are short. Too much flexibility, however, makes it difficult or impossible for the organization to retain a sense of identity and continuity. The conventional view of stability, on the other hand, is that it is required to permit the organization to exploit ‘regularities’ in an economical way. Regularities are processes and actions which lend themselves to systematization when the organization has a memory and a capacity for repetition. However, complete stability which would imply total adherence to past wisdom can be as dysfunctional as total flexibility: the organization’s capability to respond and motivate would be almost nil in such circumstances.

There are, however, a set of forces that push growing, high-tech firms towards stability. Six major forces (shown graphically in Figure 3.6) can be identified.

1. **The recruitment of different types of employees.** New employees are often recruited from larger firms and have different motivations from the original employees. Larger high-tech firms tend to employ different psychological types from smaller firms. Smaller firms (less than 50 employees) tend to attract people who prefer greater flexibility and openness whereas larger firms attract people who like stability and structure. Growth, therefore, changes or severely influences the culture of the firm over time unless the existing corporate culture is strong enough to absorb the new employees.

2. **Influence and pressure from investors and advisors to professionalize the management.** Many professional advisors fail to realize the distinctive nature of high-tech firms and recommend, or even insist on, the adoption of the ‘standard recipe’ – formal management systems and professional outside management. There is often external pressure for premature sophistication when companies go public.
3 The need to develop effective operational systems for repetitive tasks. Such systems, by their nature, try to put order into a situation where chaos would otherwise ensue. They are needed to cope with both the increased complexity and scope of operations that typically accompany rapid growth.

4 The introduction of professional management from outside. Typically, new professional managers bring with them management styles which are the antithesis of the entrepreneurial culture that characterizes the start-up and early growth phases of the small high-tech firm. Logical decision-making processes which are more analytical and maybe more rational than those found in entrepreneurial firms contribute to organizational stability.

5 Adoption of formal management practices. Management systems which ‘professionalize’ the firm reduce flexibility, as already discussed.
6  Constant change. Growth is accompanied by constant changes in staff, job demands, organization structures, systems, products and markets, all of which create uncertainty and ambiguity. Some fast-growing high-tech firms reorganize four or five times a year. While constant change encourages flexibility, and a few managers actually thrive on it, many people are not comfortable in an unpredictable setting; they prefer and search for a more stable environment. Thus, paradoxically, constant change itself acts as a force driving stability.

Those high-tech firms that manage growth most successfully balance the need for flexibility and the need for stability. Three approaches to this difficult management problem are possible:

1  a compromise response whereby the organization tries to achieve balance;
2  alternating emphasis on flexibility and stability (the see-saw approach);
3  simultaneous expression of the two necessities in different parts of the organizational system.

In reality the ideal balance is impossible to achieve. Instead, organizations try to approximate such a state through a compromise response, using constant interaction and experimentation. While constant interaction may at first sight appear laudable because it promotes learning and is a sign of flexibility, it may well have the opposite effect in practice. Change occurs daily in a growing company, often in very minor ways that are too small to be noticed by management. However, the cumulative effect of a succession of minor changes can significantly shift the organizational capabilities of the company before management realize what has happened. While the most commonly used approach, it is probably the least likely of the three approaches to work in practice. The following comment from the CEO of a company based in Boston's Route 128 sums up this approach: ‘We must introduce professional management at all levels in the organization but do it in a considerate way so we do not lose our flexibility.’ To the firm’s professional advisors or investors this was probably music to their ears, but two years later the company appeared to have lost its way without having introduced professional management successfully and having lost many of its most creative engineering staff.

The see-saw approach, whereby the firm alternates between periods of stability and periods of flexibility, may sound like an attractive alternative, given that balance can rarely be achieved using a compromise approach. This is the approach advocated by Maidique and Hayes in their study of high-tech firms:

*The successful high-tech firm alternates periods of consolidation and continuity with sharp reorientations that can lead to dramatic changes in the firm’s strategies, structure, controls and distribution of power, followed by a*
The problem of managing growth

In practice though, it is often extremely difficult to shift direction without a crisis or a change in leadership.

The third approach – the simultaneous expression of the two necessities in different parts of the organizational system – can also be successful. Nevertheless, it can easily deteriorate into conflict and confusion unless managers and employees can learn to live with ambiguity and build constructively on the natural tensions that arise. There are no sure-fire recipes for success, so firms have used a variety of mechanisms to achieve the desired balance. For example:

- The entrepreneurial (flexible) founder moves up to chairman and keeps responsibility for product development and strategic development.

- The organization is split structurally into a ‘professionally’ managed operations and marketing arm and a separate, flexible product development activity. This is the approach Computervision Inc., a US company, took after it purchased Cambridge Interactive Systems. The danger of this approach is that the product development employees are divorced from their customer base, which is a source of major innovation for all but a few advanced technology firms.

- Strong top-down performance standards are set for each part of the organization which, when taken in totality, achieve the desired balance. These standards are most effective when built into the organizational culture at an early stage and then vigorously maintained throughout the period of rapid growth.

- Complementary appointments are made. One of the key reasons for the success of many high-tech ventures is the existence of a balanced team, particularly in terms of skills, but sometimes in terms of power also. As high-tech firms grow, it is common to find efforts being made to ensure the right mix of top management skills and philosophy. Intel, the semiconductor manufacturer, has taken this idea further than most by having two individuals with contrasting backgrounds and experience in most boxes on the senior management organization chart.

The fourth approach involves constant change and is probably more appropriate for the growing high-tech firm than the other three approaches, since the firm’s ability to react quickly is part of its competitive advantage. The approach involves a continued process of organizational redesign driven by the chief executive. The aim is to have all employees committed to constant change, since the forces driving stability will provide enough of a natural counterbalancing force that no specific action is necessary to promote stability. There are two principal problems with this approach. First, there is likely to be a firm size beyond which this
approach is impractical to implement, and second, there is likely to be a limit to the rate of change with which the average employee can cope. The increasing use of joint ventures by high-tech firms could be evidence that firms recognize both the need to increase the rate of change and that they face both these limitations.\textsuperscript{18}

\section*{SUCCESSFUL GROWTH}

Managing fast growth in entrepreneurial firms is one of the most difficult challenges. Such firms are inherently fragile for the reasons already discussed in Chapter 1, but fast growth magnifies the weaknesses that already exist and presents a new set of problems. Since the problems cannot be avoided, the question to ask is: how can the high-tech firm overcome the problems associated with growth?

The short answer to the question is to say, concentrate on the people issues. The employees are the engine that makes the firm successful. Their commitment and motivation which has allowed the firm to enter a growth phase has to be nurtured through the many changes that are needed to manage fast growth. In reality, management of fast-growth firms are often overwhelmed by the problems and pressures of keeping pace with demand. They approach change on an \textit{ad hoc} basis, improvising as necessary to contain one problem after another. Unfortunately, there is no magic answer, since the most successful fast-growth, high-tech firms often adopt a paradoxical approach to managing growth. The need for both stability and flexibility simultaneously requires a careful balancing act between:

- strong central leadership and decentralized, task-oriented management;
- entrepreneurial and professional management; and
- processes providing organizational cohesion and those promoting individual responsibility.

Too much emphasis one way or the other on any of these three dimensions and the solution becomes part of the problem.

\section*{Strong leadership and a balanced management team}

Most high-tech firms that have experienced a period of successful growth are characterized by a strong leader who has a clear vision and objectives. Strong leadership in high-tech firms does not automatically imply an autocratic style as it so often does with small firms generally. The problem with many fast-growth, high-tech firms is that a strong leader exists who is recognized for his or her entrepreneurial and technical talents, but the individual does not have a broad understanding of what leadership entails. They do not understand how to manage transitions and how to develop and improve the organization on a continuous basis.
Good leadership in growing high-tech firms involves communicating very clearly the vision, values and objectives of the business throughout the organization. Strong leadership provides a key role in overcoming the confusion that usually accompanies growth, and is necessary to build and maintain the cohesiveness of the organization. All employees need a common understanding of the company that management are trying to build.

Strong leadership, however, must be supported by a well-balanced top management team to avoid any ‘excesses’ on the part of the leader, and to ensure that no functional areas are neglected. Too often strong leaders are interested in only one aspect of the business – often the technology aspect – and lose interest in the more commercial side of the business.

Torrent and Telluride are two companies that demonstrate the need to adjust the balance of the management team as the company evolves. Torrent Networking Technologies Inc. was founded in 1997 by Hemant Kanakia, a veteran of AT&T Bell Laboratories. Torrent quickly established itself as a serious player in the Internet router market, competing against the dominant player Cisco Systems. Under Kanakia’s leadership as CEO, Torrent achieved high growth, partly because it created and patented a way to encode the routing function in silicon, which enabled it to bring to market two generations of gigabit routers in a little over two years. In 1999, the founding entrepreneur and investors recognized that the leadership needs of Torrent had changed. Kanakia’s background in research and development had been instrumental in getting the company to where it was, and very quickly at that. Going forward, it was felt, other experience would be able to add greater value. Therefore, at the beginning of 1999, Torrent brought in a new CEO, Jean-Luc Abaziou, formerly president of Alcatel Data Networks, with Kanakia taking up the chairman’s post. The proof that refocusing the skill set of the top management team had maximized value came when Ericsson bought Torrent for $450 million soon afterwards. Torrent’s original funding had been $16 million.\textsuperscript{19}

Telluride (www.tellgroup.com) was founded in 1991 by Jeff Behrens and named after a ski resort in which he had spent a most rewarding scholarship period. Telluride manages the technology infrastructure of other companies. Behrens started Telluride in his bedroom by charging $50 an hour and was soon hiring staff to service a growing client list. But he noticed that the business he had won had some critical shortcomings: customers argued about fees, on what was anyway low-margin work, and cash flow was risky. He therefore took the decision to implement a new pricing plan, which resulted in Telluride losing all but one customer over an 18-month period. However, these customers were replaced by others who provided better quality revenue streams. Behrens is ready to apply the same pragmatic approach to staffing: ‘… Hiring technical managers has become the most difficult aspect of the business …. I have to bring in more management talent … [and] this may force us to … evaluate or even fire existing managers.’\textsuperscript{20}
We saw earlier in this chapter that one of the problems of growth is that the demands of a job outgrow the managerial capability of the individual. For a management team to be well balanced, it is essential that hard decisions are taken about those managers who can no longer adequately perform to the required standard. This is a particular problem in growing high-tech firms where members of the founding team may have great technical skills but no managerial talent. The way successful firms deal with this problem is to distinguish very carefully between directors and managers. The chairman of one software company commented:

We have directors who have never been managers, because they’re no good as managers. They are software engineers. It’s a hard decision to tell one’s co-founders they can only be directors and not managers, but intelligent people can be so stupid that you cannot put them in charge of anything.

Throughout the growth process it is important that top management maintains a ‘hands-on’ style for as long as possible to ensure that the focus, drive and energy which are characteristic of successful entrepreneurs do not fade. Once top management distances themselves from the employees, it creates a dangerous gap. ‘If you can no longer be one of the employees, you lose something,’ says John Gifford of Californian semiconductor manufacturer Maxim Integrated Products.21 It is interesting to see just how often the original entrepreneur who has moved ‘upstairs’ to the chairman’s job has to come back and play an operational role when high growth ends up as poor performance.

Balancing entrepreneurial and professional management

Those firms that have been most successful in managing themselves in a ‘professional’ way during rapid growth have been those that started using professional management approaches at or soon after start-up. From the outset, Compaq acted like the big company it was quickly to become. Tight financial controls and forecasting systems were put into place even before production began; only big-name banks, attorneys and auditors were employed. ‘You’ll find that our outside advisors have the same profile as our own managers – big, experienced professionals that the company can grow into. There are plenty of opportunities for change when all the underpinnings are solid,’ said vice president and chief financial officer John Gribi.22 Professional management is also a key part of turning around the larger, established high-tech business. One of the authors was recruited into IBM in 1995 as part of its turnaround under Lou Gerstner. One of the challenges in IBM at that time was to discard bureaucratic management that added little value while re-emphasizing ‘professional’ management. An example of the former was the rule that IBM employees had to wear dark blue suits and white shirts; this rule was discarded and
a casual dress policy implemented instead (although management in London ignored the change for a couple of years). An example of IBM re-emphasizing professional management was the prioritization of customer contact over internal meetings.

Good management saw Compaq through explosive growth following its first product shipment in 1983. First year’s revenues were $111 million and in 1984 sales jumped to $329 million. Company founder and president, Rod Canion, says 1983 was the pivotal period, when the number of employees grew from 100 to 600 and production increased from 200 machines in January to 9000 in December. In 1989, Michael S. Swavely, president of Compaq’s North American division, outlined the company’s strategy for dealing with the rapid growth:

In terms of managing the company’s growth, we followed three major principles. The first was to make sure that we had adequate financial resources. The second was to ensure that we hired the management talent that could guide the growth of the company in a start-up phase as it developed into a very large corporation, while at the same time maintaining management consistency. The third principle, from a systems perspective, was to install systems from the beginning that could handle growth up through a million dollars or more. The basic concept in the formation of the company was that we would be a large company that happened to be in a start-phase.23

But despite this strategy, Swavely did not think that managing Compaq had been an easy job.

It has been difficult in every way. I think that it’s almost inconceivable for a manager in a mature industry to understand what it’s like to manage growth that’s been so explosive, because it’s much more than just a company challenge. It’s a personal challenge. Your job completely changes at least once a year and probably more often than that as you rocket through these growth stages. Nothing stays the same. If you can’t deal with that kind of environment, it would drive you crazy.24

A similar approach was used at Xoma Corp, a biotechnology start-up. Pat Scannon, the founder, recognized the need for professional management early in the company’s development and hired Steve Mendel as chairman and chief executive a year after its inception. ‘When you bring managers in late, they come into a situation where spending is unlimited, people have too much freedom, research is all over the place and prospects are not really identified,’ says Mendel. ‘Someone has to stop the party. Because we started early we never had that party.’25

The message from these companies is very clear: start as you intend to continue. Introduce a professional management approach as early as you possibly can. By
introducing certain disciplines and standards into the entrepreneurial culture from the beginning, culture shock can be avoided or substantially reduced when the rapid growth phase actually occurs.26

When rapid growth does occur, it is vital to maintain those parts of the entrepreneurial culture which are critical to the success of high-tech firms. Entrepreneurial capabilities necessary for success include the ability to:

- make decisions quickly;
- rapidly redeploy resources as market and competitive conditions change;
- have fast internal communications;
- obtain rapid feedback from customers;
- be innovative;
- stay flexible.

Entrepreneurial cultures are flexible and informal. The best performing companies make conscious efforts to inculcate flexibility into the organization at an early stage. Successful growth firms achieve this by being rigid in their demand for flexibility and spending a lot of time thinking about the type of people they want to hire.

Maintaining an informal culture requires keeping the number of levels in the organization to an absolute minimum. Although some hierarchy is inevitable, the negative effects of hierarchy can be limited by taking steps to ensure the firm is a single-status employer. This means that all employees are treated the same where fringe benefits are concerned. All employees attend the annual company outing/party. Although seemingly simple, this becomes increasingly difficult to implement as the firm grows.

In nearly all high-tech turnaround firms it is necessary to recruit some senior managers from outside the firm – earlier we gave the turnaround of IBM as an example and that turnaround was led by Lou Gerstner, who was recruited from outside IBM. However, winners tend to devote time and effort to developing senior managers from within the organization, and IBM under Lou Gerstner is an example of this, where existing IBM managers were promised challenging career paths during the turnaround if they ‘bought in’ to the new ideas. One study of successful mid-size growth companies in the USA found that 75 per cent of senior executives ‘had risen from the ranks’ and that where they had to recruit high-level management skills from outside, considerable efforts were made in ‘understanding them, reviewing and reinforcing their roles and encouraging supportive interaction with the old guard’.27 Successful high-tech turnarounds adopt the same policy.

The introduction of professional management which involves large company management systems (as opposed to operating systems) being brought in should be avoided at all costs. Innovation, particularly in the area of new product
technology, is critical to the continuing success of the growing high-tech firm. Management must ensure that it continues to encourage innovation by tolerating failure, allowing a certain amount of organizational slack, and encouraging a culture in which technically oriented employees continue to be motivated. During the turnaround of IBM in the 1990s, much of the change was simply discarding the accreted bureaucracy and non-value-adding large company management systems that had grown up in the previous decade. Commenting on the same issue at Apple Computer, John Sculley said:

If I had come in and just tightened everything down and sanitized it, the very things that make Apple an unusual company would have been lost – the creativity and innovativeness to develop new, exciting products that are changing the way people think, learn and work.

In July 1998 DuPont and Merck ended their seven-year-old DuPont Merck joint venture by DuPont buying out Merck’s 50 per cent share for $2.6 billion. This created DuPont Pharmaceuticals as a wholly owned subsidiary of DuPont, with 4200 employees and sales of $1.4 billion, against sales for the parent group of $27 billion. It fell to Nicholas Teti, president of DuPont Pharmaceuticals, to lead the company and increase growth. In an interview, Teti emphasized the importance of maintaining the right kind of professionalism in management, as opposed to cumbersome bureaucracy: ‘Swiftness of action and an entrepreneurial spirit, hallmarks of the smaller players, served DuPont Merck well. To avoid sacrificing those qualities … DuPont has granted the pharmaceuticals business some continuity and independence of management …. DuPont chairman and CEO Charles O. Holliday, Jr believes in ‘differential management’ of the separate corporate businesses.’

Organizational cohesion and individual responsibility

Holding the organization together as the firm grows requires both strong leadership and sound management from those at the top of the organization. When the firm is small, top management have direct contact with all employees and are probably involved in most of the hiring decisions, and new employees are easily absorbed into the culture. Beyond a certain size, new employees no longer take on the values of the earlier employees unless specific management actions are taken to reinforce the culture. The culture of the firm is the glue that provides the organizational cohesion.

At Sun Microsystems, sales reached $2 billion within seven years of the company being founded. By 1989 the company had 8900 employees. As numbers grew, some of the classic symptoms of growth started to emerge: labour turnover
rates increased as stress began to take its toll. When the company was small, the chief executive, Scott McNealy, was able to deal with such problems by gathering everybody together for pep talks, but as Sun grew, a formal, written mission statement was developed, and in 1988 a ‘quality of life plan’ was issued. The goal was to get employees back in touch with Sun’s mission and strategy and to regain some of the feel of the start-up period. McNealy started to communicate Sun’s vision through quarterly videos on strategic issues, problems and solutions. One such video was on recruitment to help managers understand the importance of hiring the right people.\footnote{31}

During periods of rapid growth, successful firms make a conscious effort to build cohesion. Among the processes used are:

- intensive training both to develop employees’ skills and to reinforce the cultural values of the company. This includes training for senior management on how to manage change;
- increased emphasis on communications. Communications becomes much more complex as the firm grows, and a greater investment of management time is needed to ensure vision, direction and values are constantly put across;
- greater use of integrating mechanisms such as multidisciplinary project teams, matrix-like organizational structures, job rotation and physical location of people;
- actions to motivate technical staff who see management reaping rewards of bigger salaries, titles, etc. Typical actions involve instituting technical forums, dual career ladders, etc.

Simultaneously with providing organizational cohesion, management have to ensure that line management is fully accountable for performance. Accountability requires clear definition of responsibilities and the avoidance of complexity, and this can conflict with some of the integrating mechanisms used to promote cohesion. One commonly used approach to encourage accountability and motivation is to break down the growing firm into divisions or smaller business units to achieve the type of effect obtained at DuPont Pharmaceuticals.

Small divisions can be made commercially and technically responsible and preserve some of the characteristics of the entrepreneurial small firm. However, the danger is that collaboration across the organization declines as the identity of the organizational units increases. The most successful firms try to get the balance right: they recognize that it is legitimate for each business unit to develop its own culture but that the corporate culture must be utterly dominant.

Managing high growth involves managing rapid change. It requires management to embrace constant change. Some of the key points that emerge from this chapter are summarized below as tips for managing growth.
The problem of managing growth

- Ensure strong leadership with clear vision and objectives.
- Have a well-balanced management team.
- Maintain a ‘hands-on’ top management style with active involvement in the innovation process.
- Do not confuse direction and management: take tough decisions on individuals quickly.
- Do not confuse the need for operating systems with a need for professional management systems.
- Stay informal and ensure single status.
- Develop processes to maintain organizational cohesion.
- Develop processes to promote innovation.
- Give clear responsibilities to line management.
- Keep the business simple: avoid complexity.
- Set performance standards: use external benchmarks.
- Make key decisions quickly.
- Rapidly redeploy resources where necessary.
- Divisionalize when appropriate.

WHEN GROWTH STOPS OR SLOWS

High growth rates cannot be maintained for ever: most high-tech firms sell industrial goods which are subject to cyclical demand patterns. Although they may successfully grow through a recession when they are small, this is much more difficult to do when the firm is larger. It is then that the firm has to go through a period of consolidation (perhaps as a prelude to a further period of growth later). The approach to consolidation depends heavily on whether growth stops abruptly and the firm hits a financial crisis or whether growth continues but at a substantially slower rate. In either case, consolidation is a different management challenge to managing growth. The only similarity is that once again it involves change – in the people, the structure, the systems and the culture.

Where the company stops growing it may well hit a financial crisis which puts it straight into the category of a turnaround. Managing such situations is the subject matter of the next two chapters. If, on the other hand, growth slows down but there is no financial crisis, consolidation still involves considerable strategic and organizational change. Strategically, the firm will need to rethink its strategy as the key factors for success in the core business are likely to have changed. Most
likely the firm will be trying to be ‘all things to all people’ and there will be a need to refocus the firm’s product-market strategy to take account of the new entrants that are likely to have been attracted into the market. This will probably involve withdrawing from some product-market segments and employing strategies designed to improve productivity and cost efficiency in others, since the chances are that the firm will have lost some of its technological differentiation. The major challenge for firms at this stage is how to capitalize on their innovative capability by defining new product-market areas or introducing a new generation of innovative products to differentiate itself technologically. New strategies may also involve developing new strategic alliances, even with old enemies. Thus, Apple and IBM and even Apple and Microsoft are now working together, something that would have been unthinkable 15 years ago. In a survey of 100 high-growth, high-tech firms, management consultants Booz Allen & Hamilton found that 80 per cent of the firms surveyed needed to alter or refine their strategy and form new strategic alliances as they grew.33

At the same time as reassessing their competitive position, restructuring and downsizing may be necessary to regain effectiveness and momentum, even if the firm is not in a crisis situation. Organizationally, the excitement and strains of fast growth disappear and a new set of problems appears. The pressure to reduce costs, which leads to more formal managerial control systems for business planning, resource allocations, etc., tends to stifle radical innovation. Promotion opportunities disappear and key employees leave. The existing management are often unable to cope with the new environment and have to be replaced. In the Booz Allen study referred to above, over 70 per cent of the firms surveyed had to restructure or resize the business at various points in their history even though they were still growing and had ample market opportunities. Even though the firm may not be in crisis, the types of strategies discussed in Chapter 5 will probably be necessary if the firm is to have any chance of moving back into a fast-growth mode or to stop itself slipping into a classic crisis situation.

Fast growth increases the fragility of the high-tech firm since growth means that the firm is constantly outgrowing its own capabilities. The three ‘internal’ forces driving fragility identified in Chapter 1 – resource shortages, the entrepreneur and the nature of the employees – are all stretched to near breaking point. Growth seems to leverage the weaknesses that are inherent in the small high-tech firm.

**SUMMARY**

This chapter has identified the typical problems faced by high-tech firms when they go through a period of rapid growth. The standard approach for dealing with growth – introducing professional management – must be implemented cautiously, since not
all aspects of classical professional management are appropriate for the growing
high-tech firm. Successful growth requires a careful balancing act between strong
central leadership and decentralized, task-oriented management, entrepreneurial and
professional management, and processes providing organizational cohesion and
those promoting individual responsibility. The most successful firms prepare for fast
growth from day one of their existence. Managing fast growth is the supreme
challenge for those who love managing constant change.

Notes
1 Information Week (2000) 22 May.
Oxford, pp. 244–9. Older works on this subject, which are all still relevant, include:
Interview’, Wall Street Corporate Reporter, 12 February.
8 Flamholz, E.G. (1986) How to Make the Transition from an Entrepreneurial to a
based new ventures’, Academy of Management Journal, 31 (2), pp. 257–79; Scott, M. and
pp. 45–52.
10 The list of symptoms is based on a combination of field interviews and literature. See, for
example, Flamholz, E.G. (1986) How to Make the Transition from an Entrepreneurial to a
corporate architecture’, The Academy of Management Executive, August.
are the problems found outside the high-tech sector, they are also found in emerging
economies, for example, see Mitra, R. and Pingali, V. (1999) ‘Analysis of growth stages in
small firms: a case study of automobile ancillaries in India’, Journal of Small Business
Management, July.
16 Maidique, M.A. and Hayes, R.H., op. cit. Similar conclusions were reached by Romanelli,
evolutionary perspective’, Management of Technological Innovation Conference
Proceedings, Worcester Polytechnic Institute. Biologists have of course been familiar for
some time with the notion of punctuated equilibrium, which is essentially the class of model
proposed by Maidique and Hayes, and several management theorists whose findings echo Maidique and Hayes have used the notion of punctuated equilibrium as an explanatory schema; see, for example, Sridharan, U.V. (1998) ‘The effects of organizational stability and leadership structure on firm performance’, *Journal of Managerial Issues*, 22 December.


19 ‘Cover story: Innovators – seven IT startups are finding big opportunities to capitalize on the rapid pace of business change’, *InformationWeek*, February 1999, p. 40. Also www.sproutgroup.com/torrent.html


24 Ibid.


The inevitable crisis

- Causes of decline  90
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- The spiral of decline  111
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Sooner or later everyone involved in the management of a high-tech firm has to manage a crisis which threatens the very survival of the business. Few firms have grown into large, well-established organizations without facing at least one major crisis. The fragility of the high-tech firm means that the crisis can come at any point in the firm’s development and will be characterized by severe cash flow problems, often accompanied by a sharp drop in profits in a very short period of time. High-tech firms differ from more conventional firms in the speed with which a crisis develops: they can look comparatively healthy one day and be heading for oblivion the next. The telecoms industry in 2001 provided plenty of examples.

This chapter and Chapter 5 are based on a detailed analysis of the causes of decline and recovery in 30 (medium and small-sized) high-tech firms in the USA and the UK. The findings show that, although there are some similarities, significant differences exist between the decline and recovery of high-tech firms and well-established ‘conventional’ firms not operating in areas of high-technology.¹ This chapter, which focuses only on the causes of decline and the nature of the resulting crisis, shows that a single causal factor may trigger a chain reaction in high-tech firms which rapidly leads to a crisis situation. In the more ‘conventional’ turnaround, it is usually a series of factors occurring simultaneously that leads to a severe crisis.²

The research on which this book is based identified ten principal factors which are the main causes of crisis for companies which have already established themselves as profitable businesses. These ten factors and the frequency with which they were found in the research project’s group of 30 companies are shown in Table 4.1. Other problems exist but do not occur so frequently. This chapter discusses each of the ten causes and then suggests some reasons why there is usually a rapid escalation of crisis and how the causes differ by size and growth rate of the company and between manufacturing and service businesses.

<table>
<thead>
<tr>
<th>Causal factor</th>
<th>Percentage frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Weak general management</td>
<td>53%</td>
</tr>
<tr>
<td>2 Poor financial controls</td>
<td>50%</td>
</tr>
<tr>
<td>3 Product competition</td>
<td>50%</td>
</tr>
<tr>
<td>4 Diversification and acquisition</td>
<td>50%</td>
</tr>
<tr>
<td>5 Changing market demand</td>
<td>40%</td>
</tr>
<tr>
<td>6 High overhead structure</td>
<td>40%</td>
</tr>
<tr>
<td>7 Manufacturing and operating problems</td>
<td>40%</td>
</tr>
<tr>
<td>8 Cancellation or delay of major contract</td>
<td>30%</td>
</tr>
<tr>
<td>9 Poor marketing</td>
<td>23%</td>
</tr>
<tr>
<td>10 Price competition</td>
<td>23%</td>
</tr>
</tbody>
</table>
CAUSES OF DECLINE

This book distinguishes between causes and symptoms of decline since, although symptoms give clues as to what might be wrong with the firm, they do not provide a guideline for management action. To help the high-tech firm through crisis, the basic causes of the firm’s troubles must be identified and analyzed. This is not always an easy task, particularly where there is a sequential chain of causes with multiple symptoms (of the type shown later in Figure 4.1).

Weak general management

A simplistic view of management can trace almost all the reasons for poor financial performance back to ‘bad management’, arguing that it is either poor decisions or management inaction that are the causes of all the company’s problems. Even where the decline and subsequent crisis is due to external events such as changing market demand, it can be argued that management should have forecast such events and planned accordingly. While there is an element of truth in the argument, it is particularly difficult to defend in the case of high-tech firms where there has been a rapid onset of crisis, primarily due to changes in technology and market demand.

Nevertheless, over half the high-tech companies that participated in the study of turnarounds had problems at the time of the crisis which could be attributed to the chief executive officer. As with non-high-tech crises, the problems were generally worse when one person assumed both the chairman and chief executive roles.

Most of the problems of weak general management fall into one or both of the following categories:

- The technical founder(s) who lack(s) management experience: the individual is often the ‘inventor’ of the product which launched the company. He or she immerses him/herself in the technical details of the business and neglects the general management role of planning, organizing and controlling, as well as other key functional areas.

- The chief executive who cannot manage growth: even if the founder has some management experience and is able to cope with initial success, rapid growth changes the nature of the management task. At start-up, the focus is on product development and finance, but additional requirements of market development, planning and co-ordinating are soon needed. The chief executive is unable to adapt to the changing requirements of the business, particularly the requirements for effective planning and effective organization building.

High-tech firms can exhibit all the usual problems of poor general management: inability to make decisions, focus on operations at the expense of strategic thinking, lack of planning, eternal optimism that ‘things will be all right’, etc. A non-executive
director of a company making specialized circuit boards for the telecommunications industry commented on the declining performance of the company:

We all knew what was needed. What little profits there were in the circuit board division were being swallowed by the massive losses in the component division. It had to be sold off. In addition, the substantial profit potential of the new products was inhibited because the overhead of the company was just too high. Yet board meeting after board meeting the CEO persuaded us that it would be all right.

Finally, a new chief operating officer was hired who had a background of troubleshooting in large companies and had turned round many loss-making subsidiaries. The root of all the firm’s problems was that there were some very hard decisions to be taken and the chief executive could not face up to them. He was too emotionally involved.

By the time the loss-making component division was sold, problems had developed in the circuit board business, which meant that the business was no longer in profit. Most of the senior managers had been promoted, not for their ability but because they were either friends or family of the chief executive. Al knew they were ruining the company, but he could not let them go. As an outsider, the new chief operating officer has been able to ask those people to leave. Al has accepted that he cannot manage the day-to-day affairs of the company. It has not been easy for him.

Besides these general problems, smaller high-tech firms tend to suffer from two special management problems which inevitably lead to, or at least contribute to, crisis: failure to delegate, and big company attitudes towards expenditure. Both these problems are common characteristics in small firms, but they appear to be more prevalent in the high-tech sector due to the type of entrepreneur and senior management attracted to these firms.

The high-tech company founder is often a creative genius, like Steve Jobs was at Apple, then at NeXT, and once again at Apple. These technically brilliant individuals are, unlike many entrepreneurs, capable of understanding intellectually the need to delegate, but emotionally they are sometimes unable to do it. In one company, the chief executive was explaining his organization on a flip chart and we were interested to see that he had so many boxes with functional vice presidents. The apparent bureaucracy was swept aside when he took the felt-tip pen, ringed all the functions and proclaimed ‘... and I do all of this!’ The inability or unwillingness to delegate among founders is partly a function of unwillingness to give up control of the company to which they have given birth, but may also reflect the preference of many managers with a technical background for immersing themselves in detail.
One-third of the companies in the study of high-tech firms in crisis had problems resulting from the attitude of senior executives towards expenditure. This was often referred to as ‘the big company mentality’. Executives, including some founders, who had previously worked in a large company environment often sought to spend money and live an existence more in keeping with companies not short of financial resources. The prevalence of this attitude reflects the fact that small high-tech firms attract experienced managers from larger companies as they grow, which is not typical of small firms at large; and venture capitalists often favour senior managers with ‘blue chip’ CVs. One chief executive commented: ‘They like large expense accounts, to travel first class instead of economy class, to stay in the Hilton rather than Howard Johnsons, and they are used to the luxury of several specialist departments around them.’

Oregon-based Lattice Semiconductor Corporation, which was founded in 1983, is just one example of the ‘more is better’ spending philosophy. By 1986 Lattice boasted 140,000 square feet of office space for 176 employees, an Italian marble entrance way and 63 staff in sales and marketing. It filed a petition for reorganization under Chapter XI of the US Bankruptcy Code in July 1987, with a loss of $8.5 million on revenues of $11.7 million.

**Poor financial controls**

Good financial controls and information systems are important for all companies but vital for those which are growing quickly or which operate in unstable or rapidly changing markets. In the high-tech companies in the study, financial controls were considered to be poor for two main reasons: either the company had inadequate cash flow forecasting, costing systems or budget processes, or the information-gathering systems focused on matters which were wrongly assumed to be important to the success of the business.

The problem is not just lack of systems but the way in which management uses the data for control purposes. In one software company, staff were able to order computer hardware without needing to obtain authority from their manager. If they wanted something, they just rang up the supplier and ordered it. Costs rose rapidly.

An example of an information system which was analyzing the wrong information is provided by a company which produced its financial reports on a geographical basis. It failed to detect that the sales of a particular product were declining because its figures were included with all the others sold in that region. It took a ‘gut feel’ decision on the part of the marketing director to initiate product improvements because he felt that the product was outdated. It took several months to unravel the figures and prove that sales were indeed declining as a result of a competitor bringing out a superior product. If the information had been available on a product-by-product basis, the problem would have been spotted and addressed much earlier.
Adequate financial controls are vital to detect changes in the operating performance of a company, but particularly so where the product life cycles are short and erratic.

The dynamic nature of high-tech companies and the speed at which they have to change their product-market focus means that financial control systems may need to be revised constantly. Thus, a manufacturing company which made the decision to move to higher value-added products failed to allow for the increased inventory-carrying costs associated with more expensive products.

Problems with bad debts and the collection of receivables are strong pointers to weak financial control. One company employed a part-time financial controller prior to the crisis, a legacy of when it was a small firm, and had real problems with bad debts. In another company there were bad debt problems resulting from lack of attention to receivables collection.

Acting against the implementation of adequate financial controls is the high growth rate experienced by many small high-tech companies. This leaves them prone to using systems which were good enough last year but are inadequate today. Another consequence of the high growth rate is that the original financial officers find themselves out of their depth. This is evidenced by the high attrition rate of chief financial officers during the turnaround process. The high growth often acts as a deterrent against hiring in a chief financial officer from a large, established firm. They might have experience of budgeting and control systems but can be unsuited to the culture and environment that exists in a dynamic, growing high-tech firm. The firm is then faced with a dilemma – does it keep going with the existing financial manager and hope that he/she will grow with the firm, or hire in somebody with experience of managing finance in a large firm but who may not fit in well with the firm’s culture?

**Product competition**

High-tech firms outside of the service sector normally compete on the basis of product technology, usually in one or more niche markets. Since most of these firms originate as start-ups, few firms are able to develop proprietary technology which can be easily defended through patents. The product life cycle may be shorter than the time it takes to obtain a patent, the time and costs involved may be too high for the young firm and, lastly and most importantly, large competitors will typically find a way around the patent. A panel member from a large biomedical electronics company at an MIT Enterprise Forum, when asked to comment on the business plan of a fledgling company with a new analytical instrument, said: ‘The entrepreneur thinks the patent will protect him in the US market. I can tell him that we monitor all new products coming onto the market and if we see a market potential developing we will be the first to invest in the necessary research and development to break the patent.’
Severe product competition which supersedes existing products comes from three principal sources:

1. Fast-growth start-ups that revolutionize the market by developing a new or superior technology. Thus, a number of small, bespoke software houses failed when Lotus became successful in 1983, and sales of VisiCorp’s VisiCalc, the product which it superseded, declined by 75 per cent in 12 months.6

2. Large technological companies such as Microsoft, Nokia, Intel or Rolls-Royce, which have huge resources to invest in research and development of the market segment that looks potentially large enough to be of interest to them. They enter with superior products.

3. Changing industry standards. When the use of 5.25” drives became a standard by substituting for larger drives in established minicomputer and mainframe computer markets, of the few leading 8” drive makers (Shugart Associates, Micropolis, Priam and Quantum) only Micropolis survived to become a significant manufacturer of 5.25” drives. Similarly, when the industry standard changed from 5.25” to 3.5”, a new set of suppliers gained dominance, including Fujitsu of Japan and Lexmark, an IBM spin-off.

While external sources provide the product competition, another way of looking at the issue is to see the real cause of product competition as being the company’s failure to develop good new products quickly enough. Chapter 2 showed that firms often find it impossible to develop a good, second-generation product, with the obvious result that the product line soon becomes obsolete.

Diversification and acquisition

Problems associated with new strategic initiatives such as diversification (by start-up or acquisition) and expansion into new markets, particularly overseas markets, are a classic cause of decline and failure among small high-tech companies. The search for further growth through diversification and overseas expansion is extremely difficult for the small high-tech firm, because its financial resources are generally weak and its skill and knowledge base very narrow.

The typical problems revolve around the new business venture being characterized by one or all of the following problems:

- the market is very competitive;
- the new venture has significant disadvantages against competition;
- the parent company does not have the capabilities to implement its desired strategy;
- the parent company does not have sufficient financial resources to see it through any hiccups.
In some cases, chief executives of small high-tech companies argue that the acquisition, diversification or expansion move *per se*, while a cause of their problem, is not the root cause. They argue that it is pressure for growth from the investment community that is the real cause of trouble, an issue discussed in more detail later in this chapter.

**Diversification**

Always a risky strategy for small firms as it dilutes focus on the core business area, diversification is nevertheless used by high-tech companies to reduce their dependence on a single successful product and/or to achieve ambitious growth targets. Diversification, however, usually implies lack of focus which is critical for the success of small high-tech firms. One of the contributory causes to Lattice Semiconductor’s failure was the company’s ‘kitchen sink’ product strategy which included everything from SRAMs to programmable array logic devices.\(^7\)

The story of a European manufacturer of mainframe-based computer-aided design systems for the print and graphic arts markets is a classic example of how what appears as a simple move can lead to disaster. The company’s core business was under pressure in the late 1980s as the demand for turnkey workstations dropped when software and PC hardware became more sophisticated. At the same time, the directors were witnessing the PC become a commodity product in the consumer market. This made them think about building their own minicomputers to compete with PC-based systems. The directors had visited the USA when managing their operations there and had seen the rapidly expanding retail computer market, but they decided that the PC could not be a threat to their mainframe-based system for at least six years. The directors sought and won a marketing alliance with a major supplier to the print industry, which promised to sell hundreds of machines per year. On the back of this deal, the company opened a purpose-built factory in Belgium. The factory proved to be the principal cause of the decline in the company’s financial performance. Within two years the Apple Macintosh PC was able to do half of what the mainframe-based system could so, but for £7000 instead of £180 000. (In 2001 the same functionality and more was available from Adobe Illustrator for £350 and would run on any PC costing a few hundred pounds.)

The factory obviously had start-up costs and the company did not expect it to start making money immediately. By the second year of trading, the market for graphics CAD systems had become much more competitive as prices fell towards Macintosh levels and the market realized that it did not need to pay £180 000 per machine. The distributor which had been signed up was soon offering its own products which competed against the machines from the Belgian factory.
**Acquisition**

One poor acquisition is enough to bring a young high-tech firm to the point of insolvency. Even if the acquired company has been purchased out of cash flow generated from operations or by an issue of new equity (rather than from bank borrowings), any problem with the acquired company has to be met with an injection of both cash and management time from the parent company – just the resources that are scarcest in growing high-tech companies. While poor acquisitions require the same scarce resources as new ventures, the nature of the risk is somewhat different. Whereas in new ventures the risks of failure are those associated with start-ups, the acquisition risk is much more likely to be in the area of poor post-acquisition management, and in high-tech firms often in the area of product quality. The acquisition of a small company making robot kits for assembly by home hobby enthusiasts for $1 million provides a good example. The acquirer, which designed and manufactured microprocessor-based equipment for the educational market, saw the potential for selling robots to its existing customer base in the higher education sector. However, there were two problems. First, there was a post-acquisition problem: the original founders (a husband and wife team) lost motivation after they had been acquired since they no longer had a stake in the company, and a year later they divorced. To quote a senior executive: ‘The wrong one stayed.’ Second, management underestimated how the product quality requirements of the educational market were considerably greater than the hobby enthusiast market. Consequently, the company had to redesign the product at a cost of $200 000, to say nothing of the management time that went into solving the problem.

In another case, a professor of physics at Yale had established a successful company designing, manufacturing and marketing digitizers (machines which translate graphic information into digital form) to the computer-aided design industry. The company then purchased a subsidiary of the Bendix Corporation for $20 million which produced CAD systems. Within two years it became apparent that the acquisition had been a mistake. In the words of its current president and CEO: ‘The founder had made a terrible strategic blunder.’ In one fell swoop the company found itself in competition with its own customers, the established CAD systems builders. It became overwhelmed by the unfamiliar problems of selling systems rather than selling components, and it committed enormous amounts of investment to stay in touch with competitors such as IBM and Computervision. Within three years the company had invested a further $20 million in the systems company, using both retained earnings from the digitizer business and new venture capital. A great deal of management time was devoted to the troubled subsidiary. The company’s core digitizer business began to suffer and losses grew.
International expansion

The costs involved in expanding overseas and the length of time it takes to establish a profitable overseas presence mean that international expansion is often one of the main causes of failure. In late 1985, Compsoft, a British software company, announced ambitious expansion plans to enter the Continental European market with the establishment of sales offices in Germany, France, Spain, Italy and Switzerland. This was described as ‘risky but necessary’ by an industry commentator at the time. A major problem with the planned expansion was that it really fell between two stools: while the geographic coverage was wide, some of the offices were staffed by only one person so could not really be expected to be a credible force. It was a compromise restricted by the financial resources of the company, and was too much of a low-key approach to bring results. Another problem with the geographic expansion was that the overseas operations were being run with little apparent control from the UK directors. The impression was that the UK management had little idea what was actually happening in the European market or what the offices were doing.

Where international expansion involves the establishment of international manufacturing facilities before the firm becomes a ‘large’ corporation, disaster is almost certain to follow. It is very hard to find examples of small high-tech companies that have successfully managed overseas manufacturing subsidiaries.

Changing market demands

Changes in market demand – some sudden and quite dramatic – are a common cause of failure among high-tech companies. If such a change occurs where the company has weak management and/or a weak financial position, it may not be able to adapt to the changing market conditions. However, even when management and finance are not a problem, when demand drops, the magnitude and speed of the drop may precipitate an immediate crisis. In Corporate Recovery: A Guide to Turnaround Management, it says that where volume drops by more than 25 per cent in a single year, large, non-high-tech firms are likely to have extreme difficulty in surviving as independent businesses. In some high-tech firms that drop can be 75 per cent in a matter of only three months.

Four types of changing market conditions can be recognized in the high-tech sector:

1. sudden shocks due to external events which cause most customers to stop or delay buying;
2. evolutionary (albeit quite fast) market changes;
3. cyclical changes in demand (which are a regular feature of the electronics industry);
4. expectations about market growth are not met.
**Sudden shocks**

High-tech firms are always vulnerable to sudden changes in market demand. Two UK examples illustrate typical problems. A company which rented electronic logging equipment to the oil exploration industry was hit badly when the oil price collapsed, causing new exploration to drop sharply. The rental equipment was returned: no rental, no revenues and hence, no business. Another UK company hit by changes in the market demand for two of its products simultaneously was involved in the software production for the financial services industry. One of the markets it worked in was stockbroking, which slumped in 1984. At the same time, the announcement of deregulation (‘big bang’) threw the London stock market into a period of indecision. The result was that no companies were prepared to order software until they had evaluated the implication of deregulation. As these two areas accounted for over 40 per cent of the company’s normal sales revenues, the impact was dramatic.

**Evolutionary changes**

Market opportunities can disappear as new markets grow and develop due to technological advances. In 2000, digital camera sales already exceeded film camera revenues in the USA by 10 per cent. Most of these digital cameras are supplementary to film camera, and there is growing evidence that the replacement market has started to develop. The evidence from sales figures suggests that the retail market for film cameras is dying, except for disposable versions, and that new markets are being created as people find new needs resulting from digital pictures. (For example, the need to store and transmit digital pictures at or from home. In 2001, digital camera sales were predicted to be 21 per cent of camera sales and the forecast was 63 per cent by 2006.)"

In another example, the music industry is facing challenges from several formats of digital music storage, transmission and playback technologies. Even the demise or takeover of the most famous new technology challenger to the established pop music industry, Napster, does not appear to have stemmed the challenge posed to the *ancien régime* of pop music by the high-technology upstarts.

**Cyclical changes**

High-tech industries respond to different demand cycles, since most high-tech firms are selling intermediate industrial goods, the demand for which is derived from their customers’ industry. Companies selling capital goods are heavily dependent on the vagaries of the business cycle, while those in the semiconductor industry tend to be on a completely different cycle of feast and famine. Cyclical changes in demand, however, do not appear to be a principal cause of failure, although they may contribute to a company’s overall decline when combined with a number of other causal factors.
Expectations about market growth are not met

It is difficult to undertake market research for new products and to appreciate emerging markets accurately. Yet one of the most common causes of failure is management’s unerring belief in their own, or their industry’s, market growth forecasts. It seems as though industry followers and those within the industry take great pleasure in hyping forecasts which are based on scant factual information. Arguments that ‘every office needs one’ or ‘every home should have one’ have in the past been the basis of many forecasts. Not surprisingly, the companies that gear up to meet such phenomenal growth are often disappointed – and left with large inventories to prove it. Acorn Computers, one of the UK’s fastest ever growth companies, grew from sales of £430,000 in 1980 to sales of £93 million in 1984. The company manufactured microcomputers and focused on the educational market, where it had over a 70 per cent market share, and in the autumn of 1983 it launched a new product specifically aimed at the home market. In the company’s 1984 annual report, the chairman stated: ‘We anticipate another boom in home computer sales this Christmas in the UK,’ and high inventory levels were built in anticipation of record demand. Sales, however, never materialized. As one analyst put it: ‘Quarter four of 1984 did not happen.’

High overhead structure

The initial success of many companies encourages them to take on overheads at a rate which the business cannot sustain when market demand or competition increases. We have mentioned ‘big company attitudes’ about expense accounts among management, which are, of course, only one of the many contributing factors associated with high overheads. The resource base of most young firms is just too small to permit management to indulge in luxuries. Boo.com was a widely publicized European e-retail start-up, and in May 2000 an even more widely publicized bankruptcy. Boo.com spent $20 million every month it was trading, against a revenue of $680,000 for the whole of the site in the first three months, which included Christmas and New Year. It had the ‘most expensive call centre in the world’, employing 80 people in Carnaby Street, in the heart of London’s West End fashion district, and offered workers top salaries and incentives which included regular gifts, wine and food, as well as mobile phones for almost unlimited personal use.

Lest we imagine that the Boo phenomenon is new, every period of irrational high-tech exuberance has several similar cases. Take, for example, Compsoft, a UK software house which floated as a public company in 1984 and used most of the proceeds from its stock exchange listing to purchase a large manor house which was to act as the company’s head office and training centre.

The more common problem is overstaffing – staffing ahead of current needs so that expected market demand can be met. The optimism of most forecasts for new
High-tech Turnaround

high-tech products is such that it should not be surprising when the company finds itself overstaffed when demand does not materialize as forecast. One vice president of finance in Silicon Valley said of the former chief executive: ‘He pictured the company as a $100 million revenue enterprise and staffed accordingly to his over-ambitious plans.’ Both Boo.com and the online retailer Letsbuyit experienced this problem. With 350 staff and offices set up almost simultaneously in 14 countries, Letsbuyit achieved sales of only £1.4 million in its first 12 months.

At 3-COM, founder Bob Metcalfe decided to hire professional management in March 1987, less than two years after start-up. He brought in as president Bill Krause, who had been running Hewlett-Packard’s general systems division. Krause immediately started hiring people and moved into new premises, but within months it was clear that the company would run out of cash by the end of the year. Krause had expanded too quickly to handle business that was not materializing fast enough.

While high overheads may be a cause of decline, they may be the result of failure in other areas. Unanticipated costs associated with new product development or diversification, particularly international expansion, can mean that overheads escalate quickly. In one company interviewed there was a fully staffed marketing department with no products to see because of problems in new product development.

Manufacturing and operating problems

In conventional turnaround situations, high manufacturing costs are a common cause of decline, but technical problems rarely play a major role. Among small high-tech firms, however, technical manufacturing problems are often major causes of a company’s slide into crisis.

The common problem areas are:

- production process engineering;
- component and subsystem suppliers;
- problems with subcontractors;
- quality;
- poor delivery;
- inability to lower costs as volume increases.

Production process engineering

Process engineering failures were central to the decline of 40 per cent of the US high-tech turnarounds in the study. It is difficult to determine how much of the problem was due to poor product design and how much to poor manufacturing. Within the companies, each function tends to blame the other, but one thing is for sure, it is always an engineering problem and usually the result of a lack of
engineering focus on the ‘things’ which need to be done. The objects in need of focus vary by industry sector. In the semiconductor industry, for example, yield (the number of good or usable products that come off the production line) is a particularly important guide to manufacturing efficiency.

**Supplier problems**

Finding reliable suppliers and subcontractors which deliver reliable, quality products on time is critical to the success of high-tech firms. A Californian company which manufactured thin film recording head components used in magnetic disk drives illustrates the problem. The production of these components required complex processing and advanced technologies. Process engineering involved using very small quantities of a specialist chemical, a light-sensitive polymer. The company had received just two batches in two years. The third batch, however, started to create problems in manufacturing and product yields went down substantially. The company could not find another satisfactory source and had to redesign the process around a different chemical. This, too, proved to be difficult and as the problems continued, the company was driven near bankruptcy.

**Problems with subcontractors**

Subcontracting of various functions – but particularly of parts of the manufacturing process – is a common way in which high-tech firms attempt to cope with their resource constraints. The use of subcontractors has all the risks associated with regular suppliers (quality, delivery, etc.) but, in addition, has all the risks associated with high-tech firms. The position is often extremely fragile since the subcontractors themselves are prone to all the causes of decline discussed in this chapter. Consequently, those high-tech firms that make considerable use of subcontractors are vulnerable due not only to their own fragility but also to that of all their high-tech subcontractors.

**Poor product quality**

Poor product quality is undoubtedly a cause of failure since it directly affects sales and customer confidence. However, it is not a root cause of decline, since poor product quality is the result of other causal problems. The three problem areas already discussed in this section are themselves major causes of poor quality, but there are many others such as poor product design, product obsolescence, badly trained and poorly motivated employees, and inadequate investment in plant and machinery. Whatever the exact cause, product quality is a key issue for the small high-tech firm since its strategy is usually built around notions of product differentiation.

The question of product quality, must, in part, relate to the use to which the product is going to be put. Is it a critical component in sub-assembly for the
customer so that if it fails, it is the customer’s own business which is put at risk? The vice president of marketing of a company manufacturing in-flight equipment for aircraft commented on his firm’s quality problems:

> **When we finally managed to get the equipment into production, the returns among the few units that were sold were unacceptably high at 20 per cent. We were trying to persuade pilots, whose lives depended to some extent on our equipment, to relinquish the tried and trusted product technology in favour of our technology. And yet our equipment was proving unreliable.**

**Poor delivery**

Poor delivery is usually the result of a failure in the manufacturing process, which in turn can be the result of any one of a number of causes ranging from unforeseen technical problems, a failure in management systems, to poor forecasting and over-optimistic promises made to customers by the sales and marketing staff. While strictly a symptom of trouble, poor delivery nevertheless plays a significant role in reducing customer confidence, which is a critical issue in a high-tech crisis situation (see later). In the study, 40 per cent of the high-tech firms in crisis were characterized by poor delivery. In a minority of situations – but still frequent enough to be evident – poor delivery is the result of the firm having order backlogs which it cannot meet. Aldus, the desk-top publishing software firm, encountered this problem in 1988 when sales doubled from $40 million to $80 million. The company’s manufacturing capability was unable to keep up with demand and it took nine months to catch up.

**Inability to lower costs**

The need to reduce the firm’s cost base as the perceived technological differentiation of the product declines is well known. Young high-tech firms are usually hampered both by their size, in not being able to take advantage of manufacturing economies of scale, and by their culture, which is geared to innovation rather than efficiency. The need to lower costs in the first place usually results from competition from larger companies which enter the market with a me-too or equivalent product after the young high-tech firm has developed a product and had it adopted in the marketplace.

Service businesses exhibit many of the same ‘manufacturing’ problems as discussed above, in the guise of operational difficulties. Firms writing customized software provide a good example of many of these problem areas. They may have technical problems on projects (akin to process engineering problems), as well as quality and late delivery problems. Very often these are project management
problems, but sometimes the fault lies with the original project specification (i.e. the initial product design is wrong).

Cancellation or delay of major contract

In common with many small to medium-sized companies, young high-tech companies often obtain a large portion of their sales from a single customer. Conventional business wisdom has always said that overreliance on a single customer or contract is a dangerous move, since loss or even delay of the contract can lead to substantial financial difficulties. A fairly high percentage of the companies in the study of high-tech turnarounds experienced difficulties due to this factor. Most managements are aware of the risks and where they exist try to diversify their activities in some way, but this is often easier said than done.

The cancellation of a contract is usually the result of an unexpected decline in the customer’s own business (for whatever reasons), although it could reflect customer dissatisfaction with quality, service or price, or even a failure of the firm to develop new products when it knows that existing products must become obsolete sooner or later. Thus, a UK company that built up its business almost exclusively on a product which it sold to British Telecom for use in its exchanges had not developed a successful replacement product by the time the next generation of exchanges was introduced.

Distribution businesses are always particularly vulnerable to the whims of their suppliers, especially if the suppliers are powerful companies. Two UK companies in the computer industry illustrate the risks involved. MBS plc was set up in 1979 and rapidly became the largest UK distributor of IBM personal computers after they were introduced into the UK in 1983. Between 1984 and 1985, MBS increased capacity (and hence overheads) at the same time that the rate of growth of the market started to slow down. In an attempt to gain market share, MBS cut prices, taking the company from an after-tax profit of £2.1 million on sales of £42.9 million, to a loss of £2.2 million on sales of £66.8 million. Two senior marketing executives from IBM were hired to turn the company around, but just as they started to see light at the end of the tunnel, IBM substantially increased the number of distributors for its PC products, depressing margins even further.

The other company, a manufacturer and distributor of computer accessories, enjoyed enormous success by distributing a single product. The product was a real ‘money spinner’ since IBM had chosen the product to use in its PC, which made it a ‘safe standard’. There was no need for much sales effort because everyone recognized that the product was the best. The company grew very quickly, but became almost wholly dependent on the product, with about 80 per cent of its revenues generated by it. Consequently, the other business activities of the
company, maintenance and the manufacture of computer accessories, did not receive the attention that they might have done.

The supplier of the product could see that the distributor was making too much money out of the deal that had been agreed and wanted to tear up the contract. At this stage, the company should have been looking for other sources of supply, since the supplier was now in a position to do the distribution itself and had other distributors which would have been prepared to offer a better deal. The situation was eventually resolved when the founder of the supplier sold out. A month before this happened, the distributor’s sales of the product were over £800 000 per month; the following month, sales were only £150 000.

Poor marketing
The research showed that there are four principal areas where marketing tends to be a problem:

1. poor sales targeting;
2. incorrect pricing;
3. poor technical selling ability;
4. inappropriate marketing approach.

Poor sales targeting
In almost half the companies in the study, poor targeting of the selling effort could be identified. This was more often than not a problem that resulted from a lack of clear product-market focus for the company, but it also reflected weak sales management.

Incorrect pricing
On balance, companies tend to underprice rather than overprice, particularly in the early stages of the product life cycle. The reverse is more likely to be true in the later stages when competitors have entered the market and forced price levels down.

Poor technical selling ability
In the early stages of the development of a high-tech firm, the chief executive (often the founder), together with some key design engineers, takes the lead role in selling. At a certain size, however, usually not very large, salespeople are recruited. Good technical selling skills are all too rare and the temptation is to have professional salespeople with no industry experience rather than people who are capable of relating to the customer and can understand the product. This is almost the reverse of the conventional wisdom for small firms at large, which all too often hire product enthusiasts when they need professional selling capabilities.
**Inappropriate marketing approach**

Examples vary from use of the wrong channels of distribution to use of the wrong promotional approach. In all cases the problem usually boils down to a lack of understanding of the customer’s buying behaviour. The most startling example of inappropriate promotional marketing was with the company providing critical in-flight information to pilots. At one stage it decided to promote its product, on which the pilots’ lives depended, by giving away a cheap watch with each unit sold. As the venture capitalist explained: ‘The vice president of marketing had a strong background and came very well qualified. He simply had no idea of what it took to sell the units. We were trying to persuade cautious pilots of the reliability of our products with watches which failed after a few hours of use.’

**Price competition**

While nowhere as important a cause of decline as in non-high-tech companies where severe price competition can make a successful turnaround almost impossible to achieve, price competition can be the ‘killer’ for some high-tech firms. The nature of the product and technology, and the potential size of the market, determine whether imitators enter the market with a me-too product. Sometimes imitators add features or functions to try to differentiate their product, but if the core product characteristics are still broadly similar, the presence of imitators makes the product start to behave like a commodity. Customers have a wide choice of suppliers and do not perceive much product differentiation, with the result that price competition soon develops. In some instances, the power of large customers who want more than one source of supply encourages imitation. The chief executive of a manufacturer of bespoke circuit boards, which had several very large customers such as AT&T said:

> They (the customer) would push us very hard to license our products to competitors so that they would have two sources of supply. Worse, they would show our products to competitors and ask them to copy them … We had very little success in forcing competitors to use our designs. The only way the company could find to combat the problem was to push the design team to innovate constantly so that we always had a better product on the market.

Price competition can be both sudden and severe, as Psion discovered in 2000/2001. The UK handheld devices manufacturer was suffering from intense price competition in the PDA segment. Palm was selling its Palm VIIx at $199 in June 2001, not including a $100 rebate on the wireless service. So in effect, a wireless Palm, which cost around $450 a year before, could then be bought for just $99. In July 2001, Psion decided to save itself from an oversupplied handheld
market by withdrawing from the PDA market and restructuring, a move which cost the company £29 million and resulted in the loss of 250 jobs.12

PRESSURE FOR GROWTH

Although not specifically identified as a cause of decline, high-tech firms are typically expected to grow fast. Such expectations are paramount in the minds of stock market investors, venture capitalists and other investors, but are also engendered by industry hype about potential market size and by the way that role models exist in Silicon Valley, and elsewhere, of entrepreneurs who have amassed enormous fortunes in a short period of time. The media naturally pick up on the good news, building expectations in the community at large, which in turn influences the workforce from which high-tech employees are recruited. The expectation of high growth is, therefore, built into the culture of the high-tech company: optimism is pervasive. Early success breeds further optimism and quickly management begin to believe that they are invincible.

The end result of such optimism is, of course, unreliable sales forecasts. The global optimism of the late 1990s and the boom in telecommunications led to the overcapacity in local carriers and long-distance players. In the USA alone, more than 14 long-distance carriers and 1300 local players share a market reckoned to be able to support only 5–7 of the former and about 300–500 of the latter.13 However, even in the depths of crisis, it is not unusual for considerable optimism still to exist, something which can be a problem for a new turnaround manager who must bring realism to the organization.

The pressure for growth can lead management to the following actions, all of which are themselves causes of failure:

■ building higher overheads than currently necessary in anticipation of a higher level of activity;
■ building manufacturing capacity ahead of demand;
■ building inventory levels ahead of demand, thereby putting strain on working capital;
■ taking short cuts on product development with the result that new products are launched before they are at a quality level acceptable to the marketplace;
■ aiming for volume growth without paying attention to gross margins;
■ diversification through acquisitions.

Once a young high-tech company has gone public (obtained a stock exchange listing), the pressure for growth accelerates. High-tech stocks are expected to
provide high growth to give investors capital appreciation rather than dividends. A rapidly growing UK company involved in computer equipment distribution and third-party maintenance provides an example. The company grew rapidly in the early 1980s, and to maintain this growth it was realized that further financing would be required. So in February 1984 the company joined the now-extinct Unlisted Securities Market (USM) at an offer price of 116p. The issue raised £1 million, of which half was reinvested in the company and half divided between the directors. Less than a year later, after a period of growth, expectations in the market were still high and the share price reached 295p, placing the company on a price earnings ratio of 33 times earnings.

After the USM listing, the company exceeded its first profit target by 10 per cent, and for the year ending April 1985 profits increased from £663 000 to £1.1 million. In the following year, the push for growth continued and there was heavy investment in people, the main resource. The average number of employees increased by 54 to 137. However, as the company geared up for an expected 80 per cent growth and ‘strove to meet USM targets’, the market for its products turned down. This created considerable control problems, stock levels increased by £1 million as the stock turnover ratio fell, the average length of time taken to collect receivables rose to 3.5 months, while staff wages and salaries almost doubled. This created cash problems and the bank overdraft rose to £2.5 million.

That was the 1980s, but there were many cases identical in recklessness and scale, and different only in trivial details, from the Internet stock bubble of the late 1990s. One company raised around £3 million in 1999 on the Alternative Investment Market (AIM, the USM’s successor) and watched its share price rise over twentyfold. It then spent almost £1 million on professional fees to acquire a privately held company for a cash equivalent of rather less than £1 million. After several transactions in similar fashion it ran short of operating funds just as the market for its services turned down in the second half of 2001.

As in the above examples, it is usually a sudden drop in market demand at the same time as the firm has geared up for growth that causes the crisis. Revenues drop just as the breakeven sales level has been increased. An immediate cash crisis emerges. Most high-tech firms that have gone public see a public listing as a double-edged sword. The benefits are access to funds which reduces risk by keeping financial leverage low or non-existent, and an increase in credibility in the eyes of customers and suppliers. However, the pressure to grow is seen as a distinct disadvantage. There are many examples, particularly in the UK, of companies taking on acquisitions and projects which they might not have done if they had remained in private ownership. When things start to go wrong, the public company is more exposed to commercial pressures than the private one: knowledge of the company’s problems receive wider publicity, which in turn makes recovery more difficult.
FACTORs INFLUENCING CAUSES OF DECLINE

The causes of decline vary enormously, both across the different high-tech sectors and within the individual sectors. Considerably more research is required than was possible for this book to identify exactly how the causes vary by industry segment and type of company. This section takes just four factors and looks at how causes of decline vary with the size of the company, its growth rate, the rate of technological innovation and type of business (whether the company is a manufacturing or service business).

Size of company

How does the size of the company influence the causes of decline? The sample companies were divided into small companies (less than $5 million sales revenue per year) and large companies, and four differences worthy of discussion were found.

First, large companies tend to have more causes of decline than small companies. There are several major reasons for this:

- Smaller companies are more fragile: they have a weaker resource base than large companies, which means that a full-blown crisis can develop from just one or two causal factors. Larger companies are slightly more robust and require multiple causes of decline, as do conventional firms, before a crisis is reached.
- Larger companies tend to have a wider product-market scope, which tends to give some of the traditional benefits associated with diversification. Risk is spread so that sound operations may be able to partially absorb or offset problems elsewhere.
- Larger companies are more likely to have manufacturing problems which trigger a complex network of interrelated problems connected with quality, delivery, loss of customer credibility, etc.

Second, the nature of managerial weakness varies by size of company. In small companies the lack of managerial expertise of the founder(s) plays a major part in the demise of the company even though the management is committed and hard-working. In larger companies, the influence of the founder has often diminished somewhat as the result of the appointment of ‘professional’ managers, and decline or crisis is the result of management’s inability to establish priorities and ‘see the wood for the trees’.

Third, the nature of manufacturing problems varies by size of company. Small companies lack the capital, expertise and volumes to justify in-house manufacture. As a consequence, the companies develop relationships with key suppliers to manufacture and assemble products. These suppliers are also often small, resource-constrained companies because of their lack of bargaining power with larger subcontractors.
surprisingly, the supplier lacks the required levels of manufacturing expertise, and quality and delivery problems quickly result. Far from easing problems for the small company, outsourcing can result in product and process engineering problems and a high level of customer dissatisfaction. In the larger companies manufacturing issues remain critical, but are of a different kind. Here, the company has built sufficient volumes to bring manufacturing in-house, but there is a tendency for them to try to participate at all levels in the value chain, manufacturing primary and secondary components, and assembling the final product. As a consequence, there is no back-up source of supply when problems occur.

Fourth, lack of customer credibility is a real problem for the smaller companies. Many of those in the study had difficulty building credibility with their customers, and lack of credibility was undoubtedly a contributory cause of the company's eventual crisis. Credibility was also an issue in the medium-sized high-tech companies, although the magnitude of the problem was not as large since by this time they had well-developed technologies, a diverse and usually loyal customer base, and a history of on-time quality deliveries. With larger companies, credibility issues were found to have resulted from the crisis rather than having been a basic cause.

Company growth rate

Both high- and low-growth companies tend to experience problems due to inadequate financial controls and unexpected changes in market demand. Both, of course, experience management problems, with the faster growth companies experiencing the same management problems as the larger companies (and vice versa). The major differences occur in the areas of competition, diversification and manufacturing, although there are some interesting differences between the two groups of companies in the way in which financial and human resources contribute to crisis.

Competition

High-growth companies were generally less affected by product competition than small companies. With some notable exceptions in the personal computer industry, this was also true for price competition. Why? The answer is that high-growth companies tend to be somewhat insulated from competitive pressures in the early phase of market growth because their product is unique, and early success provides sufficient cash to reinvest in maintaining their product advantage.

Diversification

A feature of low-growth companies is that many (over half in the sample) experience a fall in profits due to a failed acquisition. There is some further evidence that the pressure for growth discussed above can be a root cause of crisis among high-tech firms.
Manufacturing

Fast-growing companies exhibit a number of manufacturing problems which are often central to their decline. Their internal dependence on in-house production often results in continued crisis and strain as the organization seeks to cope with necessary increases in production. Direct consequences of this include reduced quality standards and poor delivery achievement. Indirect effects include increases in product cost as lack of capacity hinders production efficiencies.

Finance

Volume growth generally leads to a significant increase in the demand for finance to fund investment in working capital and, maybe, fixed assets as well. However, the rapidly growing company’s lack of cash does not directly contribute to its decline. Lack of cash is a consequence of the crisis rather than a causal factor. Instead, venture capitalists are only too willing to support the company’s rapid growth, provided targets are being met. Availability of funds does not appear to be a constraint to growing companies. One venture capitalist commented: ‘Providing funds (for high-tech companies) is easy. In the second- or third-round deals everyone climbs on, we all like success.’ In the slow-growth companies, financial constraints do provide some impetus for the crisis. Few slow-growth companies track to budget, and if venture capitalists are involved, they become increasingly wary of supporting further development expenditure before market success has been demonstrated.

Human resources

In the human resource area one would expect that high-growth companies would find difficulty in recruiting key executives of sufficient calibre. Such executives might experience problems in the integration with the rest of the management team and might be incapable of managing the company through continued growth and change. The study found no evidence to suggest that fast-growing companies are constrained in terms of their human resource policies. Companies with rapid growth rates were usually capable of attracting talented managers. High salaries and share options often provided high-level incentives to these managers. By way of contrast, lower growth firms had more difficulty attracting top-quality employees.

Rate of technological innovation

In those sectors where the rate of technological innovation is fast (i.e. where the product life cycle is less than three years), technology problems are usually central to the crisis. The causal factors are either insufficient product development or some form of product or process engineering failure. A high rate of technological innovation may
also lead to low barriers to entry, since proprietary technology is of limited value to a company unless it can constantly keep ahead of competitors’ technology.

Type of business

There are several noticeable differences between manufacturing and service businesses. Both types of company are characterized by many causes of decline, but only poor management, inadequate financial controls and changes in market demand are frequent causes of crisis in both service and manufacturing businesses. For the manufacturing business, there are five significant causes of decline which are less likely to be found among service businesses. These are:

■ product competition;
■ price competition;
■ manufacturing problems;
■ diversification and acquisitions;
■ cancellation of major contract.

As a general rule, high-tech manufacturing companies are subject to greater competitive problems than service companies. It is easier to take apart and produce a monitor than learn to write a COBOL systems program. When the high-tech manufacturing companies first develop their products, they are often unique and therefore can be produced and marketed by a small company. However, if the products become a success, they are quickly imitated, often by Far Eastern manufacturers, on a scale and at a price which undermine the smaller operation. The problems affecting service companies tend to be more diverse and include lack of staff training which, while not a frequent cause of crisis, was significant in a Chicago-based computer maintenance company. The one overwhelming characteristic of service businesses in trouble, in addition to those already mentioned, is high overheads – generating profitability from businesses very sensitive to small drops in volume.

THE SPIRAL OF DECLINE

Crisis situations evolve in high-tech firms as a consequence of management’s failure to deal with an escalating number of problems within the organization. The speed of decline can be quite dramatic, due both to external factors – changing market conditions, speed of technological innovation by competitors, new entrants to the market, etc. – and to internal factors such as low quality, high returns, increasing inventory levels and plummeting morale. The net result is that
the managers of high-tech companies have less time to identify decline and act on it than their counterparts in conventional companies.

The study identified two patterns of problem escalation leading to crisis. The first is similar to that outlined in *Corporate Turnaround* (Slatter, 1999), whereby there is a variety of independent problems occurring simultaneously. All firms are characterized by two or three problems, but as new problems arise, the number and complexity of the situation overwhelms top management. Thus, for one company in the study, the need to develop a second-generation product coincided with the decision to acquire another company. The management were unable to meet the challenges faced by declining performance of the acquisition and their inability to develop the new generation of product.

A variant of this pattern is where a company exhibits a number of causes of failure but, even when combined, the problems are offset by strong market demand for the company’s product(s). However, it only needs some other problem to emerge – called here a trigger problem – for the whole company to be in an immediate crisis. For companies already weakened by a number of independent causes of decline, a relatively small downturn in the business cycle, a delay in receiving a contract from a customer or a problem with a subcontractor can act as a trigger problem.

The second pattern of decline may be unique to high-tech companies. It starts with a single trigger cause of decline at an identifiable point in time which sets off a chain reaction of sequential causes and symptoms of decline. Here, there is interdependence between a variety of causes and symptoms of decline. One problem leads to another and a causal relationship can be identified. For example, product development difficulties lead to process engineering problems, which in turn result in lower quality products. A subsequent high level of returns then increases work in progress, with the result that manufacturing efficiencies decline further. Customer confidence declines, sales volume drops, finished goods inventories increase and a cash crisis develops. The sequence is shown in Figure 4.1.

Taken individually, the problems might be readily manageable, but because they are interdependent there is often a complex web of problems difficult to disentangle. The big difference between the two patterns of decline is in the position of the trigger cause. Where the causes are largely independent, the trigger comes at the end of the process, after the company has already been weakened by a series of problems. Where they are sequential and interdependent, the trigger cause comes first. In the latter situation, the five principal trigger causes identified by the study are:

1. product competition due to failure to generate a new generation of products on time, or product design weaknesses;
2. new entrants competing on the basis of price competition;
3 manufacturing problems that affect product quality (including supplier and subcontracting problems);
4 changing market conditions, usually a drop in demand;
5 cancellation or delay of a major contract.

**Fig. 4.1 Sequential causes of decline – an example**

As the health of the company starts to deteriorate rapidly, there are two critical areas which act like cogs in accelerating the process of decline. First, loss of customer confidence – unacceptable quality, late deliveries and declining financial performance (no customer wants to buy a high-tech product from a company it thinks might become insolvent) become self-reinforcing, with a disastrous impact on sales volume. Second, management and staff morale spirals downwards at a rapid rate as they hear one piece of bad news after another. Poor internal morale means some key individuals start to look for employment elsewhere, before the axe falls, and efforts to solve the company’s technical problems become more difficult.
The small high-tech firm can go through the typical stages of crisis development (from crisis denial to organizational collapse) in just a few weeks.14

**SUMMARY**

This chapter has outlined the ten major causes of decline in high-tech companies. The external pressure for growth on these companies undoubtedly influences management actions and leads to more crises than would otherwise be the case. A limited attempt was made to show how causes of decline vary by the size and growth rate of the company, the rate of technological innovation and whether the company is a manufacturing or service business. Finally, two patterns of decline were discussed showing how the high-tech firm can appear healthy and normal one day, but be in need of intensive care the next.

**Notes**

3 As does Slatter, S. St. P. (1999), *ibid.*, n. 2.
Turnaround strategies

- Appointment of new management  
- Tackling the cash crisis  
- Improving employee morale  
- Regaining credibility with customers and suppliers  
- Change of business focus  
- Improved marketing  
- Manufacturing changes  
- Investment in focused product development  
- Financial characteristics of successful turnarounds  
- Factors determining successful recovery  
- Summary
By the time the small high-tech firm has reached crisis point and the board of directors, the bank or the investors have triggered the start of a turnaround, there are likely to be four priority areas that require immediate action:

1. the appointment of new management;
2. the cash crisis;
3. low employee morale;
4. credibility with customers and suppliers.

A whole range of other remedial actions will be necessary which will mirror the range of problems that have either caused the crisis or have resulted from it. The choice of strategies open to the turnaround manager – usually the new chief executive – is the same as for turnarounds of more conventional firms, although there are some significant differences in emphasis.

The study of recovery strategies in 30 smaller high-tech firms in the USA and the UK together with the mid-1990s’ turnaround of IBM – one of the largest ever high-tech turnarounds in the world – showed that successful recovery strategies for high-tech firms pay greater attention to product-market and organizational change, investment in new product development, and the re-establishment of customer credibility than do successful recovery strategies for conventional firms.

This chapter discusses the eight principal recovery strategies used by technology-based firms in a crisis:

1. appointment of new management;
2. tackling the cash crisis, including asset reduction, cost reduction, new financing and financial control strategies;
3. improving employee morale, including changing the organizational culture;
4. regaining credibility with customers and suppliers;
5. change of business focus;
6. improved marketing;
7. manufacturing changes;
8. investment in focused product development.

Finally, the financial characteristics of successful turnarounds are discussed, together with a look at the factors determining successful recovery of the high-tech firm.

**APPOINTMENT OF NEW MANAGEMENT**

The appointment of a new chairman or chief executive normally (but not always) implies the removal of one of the original founders of the company. It is, therefore, a traumatic event not only for the individual (or the founding team) but also for
the company as a whole. The main reason for a new chief executive officer being appointed is because the previous CEO is regarded by other board members or outside investors and bankers as unable to turn around the company. The classic situation is the one where a technically brilliant founder lacks general management skills, particularly in the area of direction and control. Interestingly, though, this lack of skills is hardly ever regarded as a problem until the crisis begins. However, in a crisis one must always ask whether the CEO who has presided over the decline phase is able to grasp the change in direction which is necessary to turn the company round. The answer, nine times out of ten, is no. The CEO survived the crisis in only 2 out of the 30 companies in our research. Survival occurred where (a) the crisis was caused by rapidly changing market conditions and the CEO showed himself capable of dealing with the crisis, and (b) where the CEO was the majority stockholder and was a superb salesman with financial institutions. However, in both situations other new executives from outside the company were appointed to assist the existing CEO.

The replacement of founders can be quite difficult to engineer and can end up being acrimonious. Founders are invariably principal shareholders and may indeed, prior to the crisis, have recruited the individual whom the board believes should be the new chief executive. The story of the ‘battle’ between Steve Jobs and the man he recruited, John Sculley, at Apple is a well-documented example.2 However, unlike non-high-tech turnarounds where the CEO once removed nearly always leaves the company completely, it is not uncommon to find that founders, once relieved of overall responsibility, take up alternative roles as non-executive chairmen or are put in charge of new product development. This is most common in those sectors where the rate of technological innovation is fast. Whether this is possible depends on the personality of the founder.

Bob Metcalfe, the founder of 3-COM and the co-inventor of Ethernet, a local area network product, was prepared to move aside as CEO and take on the role of vice president, sales and marketing. When chairman and chief executive, Metcalfe hired Bill Krause from Hewlett-Packard in March 1981 to be president, just before the company found itself facing a cash crisis due to over-expansion. In late 1981 the board decided that Krause should take over as CEO but, knowing how difficult it would be for Metcalfe to give up power and that he could not dictate to Metcalfe, Krause looked for a way to avoid confrontation. He formed an executive committee made up of himself as chairman, Metcalfe, and the four vice presidents. Howard Charney, vice president of manufacturing, said: ‘War would have ensued if he [Krause] had tried to exclude Bob, so he included him. That made it easier for Bob to give up power because he was able to participate in the decisions.’ Metcalfe, however, feels that in the end it was their equity stake in the business that kept him and Krause working together. Metcalfe was 3-COM’s largest shareholder with just under 21 per
cent, while Krause had received 9 per cent when he joined. ‘Equity does tend to hold people together during emergencies … More than once we were a sentence away from ending the company … we just didn’t let it happen,’ says Metcalfe.³

Where do the new chief executives come from for young high-tech firms? In almost half the 30 companies participating in our research, the replacement, surprisingly, came from within the organization, and was almost always an individual with a finance or sales and marketing background. One or two new chief executives were venture capitalists who wanted to try their hand but, with a few exceptions, they were not the ‘professional’ turnaround manager who moves from one crisis to the next. Table 5.1 shows the skills most needed by the successful turnaround manager of high-tech companies.

### Table 5.1 Characteristics of small high-tech turnaround managers

1. **Professional management expertise**
   
   New CEOs appointed from outside have substantial management experience. Few are under 45 years of age. They include managers who have held senior positions in companies such as Sun and Cisco, and other managers who have established a track record of successful turnarounds, although again, few are much less than mid-40s in age. The main reasons why professional management expertise is valued are:
   - a ‘professional manager’ is able to implement systems to get control of cash, costs, production problems and inventory;
   - the turnaround manager, particularly in small companies, is required by the pressures of the turnaround and cash constraints to act in a number of functional roles: head up business and marketing strategy; act as VP, finance; co-ordinate improved production. A strong management background gives a better grounding for individuals to act in a number of roles.

2. **Understanding of technology**
   
   An understanding of technology is thought to be desirable. However, technological skills – often the main strength of the founder – are treated with suspicion, especially among venture capitalists, since such skills are associated with lack of managerial skills.

3. **Personal motivation**
   
   Motivation is rated as a key success factor. Executives and venture capitalists comment alike that the turnaround manager has to be able to operate in a small company environment – and enjoy it. As one venture capitalist put it: ‘The critical issue is what motivates the managers. Can they live without their expense account, their Mercedes? Do they really want to get their hands dirty or do they believe the turnaround’s a quick and easy way to make money?’

4. **Interpersonal skills**
   
   The major challenges for the turnaround manager are the need to rebuild morale internally; the need to appoint capable people to the team, and to motivate those people; the need to build customer confidence; the need to maintain the confidence of the venture capitalist. Those who successfully manage these challenges are usually considered to be particularly charismatic and dynamic individuals.

Source: Based on interviews with US venture capitalists and successful turnaround managers
High-tech Turnaround

At the level below that of chief executive there are usually some management changes, particularly in the USA where there is a tradition of clearing out a significant portion of the old management team, whether or not they were directly to blame for the current crisis. In contrast to the new chief executive, who is often an internal candidate, many of the second-tier management positions are filled by individuals from outside the organization: hardly surprising perhaps, since except for the very largest and oldest high-tech companies, the typical high-tech firm lacks management depth, particularly if it has been growing rapidly before the crisis. (And as IBM showed in the years leading up to 1993, even the largest and oldest high-tech companies may have management depth of the wrong kind.)

The appointment of a new director or vice president of finance and/or the strengthening of the finance team is common practice, due to the previous lack of adequate control systems and the need for investors to feel comfortable with the financial management of the company. However, due to the customer credibility problem discussed below, the marketing role is also seen as critical in the majority of high-tech turnarounds – Lou Gerstner, who between 1993 and 1995 turned around IBM (see Chapter 2, especially Figures 2.1 and 2.2), had a strong marketing background gained at Procter and Gamble. Thus, new chief executives often appoint new marketing staff, although it is interesting to note that in the case of small companies some CEOs implement marketing remedies themselves because a new marketing director or vice president is thought to be too expensive, or because they believe that they are best equipped for the job. When it is necessary to rebuild credibility with customers, the CEO often thinks it is critical that customers should have direct contact with the individual at the top of the organization.

**TACKLING THE CASH CRISIS**

Once the new chief executive is installed, his or her priority is to tackle the cash crisis which has hit the company. There are four major strategies commonly used:

1. immediate implementation of tight financial and other controls;
2. seeking additional sources of finance;
3. cutting costs to stop the haemorrhaging;
4. instituting an asset-reduction programme, if at all possible.

Sometimes the cash situation is so bad that a financial rescue package has to be put in place either before or concurrent with the appointment of a new chief executive. The investors in a Californian manufacturer of disk drives for use in computer back-up systems had to inject cash to fund the payroll the day before the new chief executive arrived. The new CEO took command with a $6 million cash infusion,
and he reduced employee numbers by 30 per cent within a few days. He said: ‘Whatever else is wrong, you have to sort out the cash position. It’s either that or bankruptcy. Then you have to cut costs or else you’ll face the same cash crisis.’

The four strategies used for tackling the cash crisis are outlined below.

**Implement tight financial controls**

Tight financial control covers budgets, cash flow forecasts, capital expenditure and knowledge of manufacturing and overhead costs. These are important in all turnarounds, but existing controls are typically poor in young firms. New procedures and systems will have to be introduced extremely quickly, something which is obviously easier to do in a small firm than a large firm. Three types of new control system are commonly needed to control cash flow, costs and risk.

**Cash flow systems**

Emphasis on systems that monitor cash is necessary in all situations. Monthly cash flow forecasts are useless since there are likely to be huge weekly and daily fluctuations in both cash in-flow and out-flow. Effective systems require good financial people with a commercial awareness about the company and a commitment to its objectives. Figure 5.2 provides an interesting example of how one young high-tech firm gained financial control.

**Costing systems**

Small firms and rapidly growing firms rarely have adequate cost information to know which products and which customers are profitable. In high-tech firms where margins can be eroded rapidly and volumes can change overnight, the profitability of the firm’s various product-market sectors needs constant monitoring. Regular customer or market segment profitability analysis needs to be built in as part of such a system, with particular attention being paid to the way in which overheads are allocated to customers. Since gross margins ought to be quite high for high-tech firms, allocation of overheads becomes critical in determining profitability.

**Controlling risk**

Since one of the major causes of crisis is the cancellation or delay of major contracts, it is appropriate for some firms to introduce simple risk control systems. Thus, one company had adequate financial control systems but no real system for evaluating large contracts. As the result of being in crisis, it has developed a ‘warts report’ which is a system whereby each contract is evaluated on the basis of ten factors which have caused contracts to go wrong in the past. If a project has a high score out of ten, it is rejected.
Case study

When the new chief executive joined the company, there were 15 people working in the finance function. They had been ‘treated like dirt’ by the founders, whose philosophy revolved around getting everything done as cheaply as possible. Immediately, the new CEO got rid of all the poor-quality people because the department was overstaffed and replaced any that needed replacing with high-quality people. ‘I got rid of four and hired one.’ He claimed that he halved the staff and doubled the productivity. He did this by instilling some commercial awareness in the department and by making the employees enthusiastic about the company.

An example of the type and style of the moves the CEO made to instil commercial awareness and commitment to the objectives of the company can be illustrated by the cash balance chart that hangs in the accounts department. Every day the cash balance is reconciled and plotted on a large chart in the accounts office, where it is visible to everyone who walks in and everyone responsible for it. It is immediately obvious whether cash is being controlled effectively or not, and acts as a constant reminder to those responsible for collecting payments and paying creditors what the implications of their actions are.

The chief executive’s openness with the staff allowed him to make public all kinds of information that might otherwise have remained hidden in the company records. He could then use this information to educate and motivate the staff. He could explain why certain parameters were important to the success of the company and used the information as the basis of rewards and competition between the staff. Three examples make the point more clearly:

1. Previously, the sales staff were paid on orders taken, which did not help the company cash flow or bad debt situation; now they receive their commission only when the cash is received from the customer. This encourages them to follow up on orders taken and to ensure that they are paid promptly. It also makes them think about who they are selling to because there is no point in them wasting their time on a call which might default on payment, as they will not receive any commission for the order placed.

2. The MD restructured the sales incentive scheme so that it became more and more attractive to sell higher volumes. There is no limit on the earnings the sales representatives can make and the young representatives the company now employs are earning very good salaries.

3. The company has arranged for the weekly sales figures to be available on Friday afternoons at 5pm. The representatives gather round and wait to find out who has made the highest sales figures for the week, and there is a great deal of good-natured competition surrounding this ‘event’. Again, charts are in the sales office showing the star performers for the week, month and year to date.

The whole motivation scheme revolves around the data that the finance department produces, and it has changed its role from being a staff function which produced the end-of-year results to being the centre of the company, providing information for all the other areas and helping them to understand the impact that they are having on the overall company performance.
Seek additional sources of finance

Unlike conventional turnarounds where obtaining additional funds is difficult, new finance is often available to the high-tech firm if it can convince financial backers – often venture capitalists – that the business still has potential. Venture capitalists rarely refinance in a crisis without substantially diluting existing equity holders or demanding major strategic and management changes. A venture capitalist with considerable experience of turnarounds said: ‘It takes some convincing to throw in financing when the company is on the point of collapse. And the only way bankers will be convinced is if they know the knife will go in.’

That said, there are innumerable examples of venture capitalists giving extraordinary levels of support to high-tech firms in crisis in the hope of very high returns. There appear to be three critical reasons why venture capitalists lend such support:

1. The loss-making company is developing a proprietary technology;
2. The market opportunity is perceived to be strong;
3. The impact of the founder.

One venture capitalist said: ‘Well, it had a lot to do with the charisma of the founder, but underlying that was our conviction that if the company could get the product right, the rewards would be astronomical.’

Debt financing is almost never available to small high-tech firms in crisis. The normal financing instrument is new equity or some type of convertible preference share.

Reduce costs

The most common source of cuts is typically in staff, which is not surprising since high overheads tend to be one of the causes of crisis, but the exact nature of the overhead reduction depends on the intensity of the crisis. Immediate and drastic overhead cost reduction is a characteristic of the successful turnaround situation, with as much as 50 per cent of the management staff being cut in some companies. The aim is to lower the firm’s breakeven point. Reducing headcount was one part of the turnaround strategy at Palm in 2000 (the other being a realignment of Palm’s offerings with customer needs). As part of the turnaround strategy initiated in May 2001, Palm’s CEO, Eric Benhamou, reduced net headcount by 250 employees and contractors, while making new hires to improve staff capability and take advantage of better talent in the depressed 2001 labour market. This kind of turnaround plan aims to deliver the sorts of improvement seen at Eastman Kodak when George Fisher became the new CEO in 1993: from $1.5 billion loss on $20 billion turnover in 1993, the profit in 1994 was $850 million, climbing to $1.3 billion on $15 billion turnover in 1995.

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As a general rule, staff cuts are in administrative areas rather than in research and development, since without maintaining (and maybe bolstering) product development activity, there is little likelihood of a sustainable turnaround. In addition, there are the usual cost-cutting measures of turning off unnecessary lights, making phone calls at cheaper times, no unnecessary travel, etc. – since small firms tend to have only one site, there is usually limited opportunity for significant rationalization. Where the firm has developed or grown with multiple sites, there may be the opportunity to integrate operations. One UK manufacturer of scientific equipment integrated its automatic test equipment business with its test instrument operations. This allowed increased utilization of manufacturing capacity and permitted some economies in sales and distribution.

Cost reduction by cutting manufacturing costs has a somewhat longer time horizon and is not a feasible strategy for specialist niche manufacturers which are price takers as far as raw material and equipment supplies are concerned. Some productivity improvement may be possible in the manufacturing area, as occurred at Apple Computer in the late 1990s, and these are discussed later in this chapter.

Cost-reduction strategies do not of course generate cash, but if implemented quickly and drastically enough, they can stop the company bleeding to death. The cash effect will vary by country, since in some European countries the severance pay required by law could actually worsen the short-term cash flow position. However, many high-tech firms in crisis are young companies with relatively high staff turnover, which means that severance pay requirements are reduced, since the amount is usually calculated in part based on length of service.

Reduce assets

Few small firms have much in the way of fixed assets that can be sold off either directly or on a sale and lease-back basis, although two UK firms in our study did just that to solve their immediate cash needs. Divestment, which is the most common cash-generating strategy adopted by large companies in a crisis, is, as might be expected, much less commonly used by smaller companies. However, where firms have diversified this is an important option, as was the case at British Telecommunications in 2001/02.

The major emphasis on asset reduction in young high-tech companies is reduction of working capital. As shown in the previous chapter, companies lose control of working capital very rapidly leading up to the crisis point. High-tech firms in crisis tend to reduce working capital significantly during the year in which the crisis is at its peak or during the following year. However, in most cases the reduction is only a return to previous levels, as witnessed by one company that doubled its working capital days to 308 in the year prior to crisis and then cut them back to 164 days as part of the recovery plan.
The personal computer companies provide the most dramatic examples of inventory reduction. Huge discounts are usually required to move surplus inventory quickly, particularly since news of the company’s problems makes dealers and customers less willing to buy if they think there is a chance the firm will go bust.

**IMPROVING EMPLOYEE MORALE**

It is curious to think one moment of drastic staff reductions and then in the next moment of building morale, but virtually all new chief executives in high-tech turnarounds say that rebuilding morale levels is an early priority. Most CEOs talk of the great lengths they will go to to encourage staff. They use a variety of methods to improve commitment to the ailing companies. For some, rebuilding morale is a matter of doing ‘small things’. One CEO related:

> In many ways it is the little things that count. I was met coming into the office this morning by three of the programmers, who casually suggested having breakfast. I never turn that sort of suggestion down. It gives me a chance to communicate my hopes for the company; to tell the staff that the management believes that the company has a future; to hear their problems; and to tell them the realities about the company. Everybody here knows how tight it is.

Rebuilding morale is about leadership, changing the organization culture and, above all, communications. The organizational characteristics of small high-tech firms have a big influence on how this should be carried out. The tough, archetypal, no-nonsense turnaround manager described in *Corporate Turnaround* (Slatter, 1999) is unlikely to be the right person to improve employee morale. High-tech employees are a different breed to employees in conventional companies and need to be treated with a lighter touch. They need to be inspired and encouraged to meet tough targets rather than be subjected to constant criticism for failing to be the best. This is particularly true in a crisis when employees are feeling insecure, even if they are the survivors of a drastic cost and asset reduction exercise. If top management is not careful, the inherent mobility of the high-tech employee will see key technical resources leave the company. This would lead to an already fragile situation becoming even more fragile.

High-tech employees tend to be cynical of new management, particularly those coming in from outside who give the impression they know best. They do not readily accept new strategic directions and exhortations from top management. Their attitude tends to be to wait and see: to let the new chief executive prove him or herself. Thus, top management must work hard to get their message accepted.
Although flat organization structures tend to facilitate good communications, emotional acceptance of the necessary changes is still hard to achieve. Changes in top management’s technological outlook or philosophy are hard for middle managers and engineers to accept in small high-technology firms. The outward appearance of openness and flexibility to change can soon disappear when new ideas are introduced. Thus, when management in one computer manufacturer decided they had to make it more of a ‘systems company’, middle management rebelled and demanded a showdown meeting with the CEO. They considered systems products dull and boring – a philosophy which did not fit with what they were trying to do! A crisis was averted when the CEO explained how the new moves were still consistent with the original spirit of the company. This phenomenon is quite common in our experience: a similar middle management revolt occurred in IBM’s UK operating company during a pre-Gerstner turnaround attempt, and at the other end of the corporate scale, one of the authors experienced the same phenomena when he was a turnaround CEO of a 20-person UK high-tech company.

At the end of the day, nothing succeeds like success in turning the company around. Some cynics may remain, but the morale of the vast majority of employees will be improved as the company returns to profitability and, above all, begins to re-establish its reputation in the marketplace and the local community.

**REGAINING CREDIBILITY WITH CUSTOMERS AND SUPPLIERS**

How to regain credibility in the marketplace after a crisis is a key issue for those high-tech firms that have been damaged by quality or delivery problems. However, nearly all high-tech firms that have been in a crisis have a job to do in restoring customer confidence. A venture capitalist suggested:

*Often, high-tech companies are battling to persuade large customers, who depend in a critical function on the type of product, that their product should be trusted; that the benefits outweigh relying on trusted names like IBM. Often because the product is proprietary, the company succeeds. But if things go wrong it is a much bigger battle to persuade companies to come back a second time. That’s one reason why high-tech turnarounds can be so difficult.*

To take one example, a company in Chicago began producing software for use by insurance companies which made the management of the back-room functions much easier. The product was very effective, but even in the early days software projects ran over, and the company began to lose credibility with its customers. The new CEO commented:
Turnaround strategies

Other than work on morale, I see my job as being Mr Nice Guy to the clients. I fend off irritated customers and build credibility with new ones. That job is getting easier as clients see that my company is now stable. It’s taking a long time, it takes a lot of patience, but our clients are beginning to believe in us again.

Regaining credibility takes time. As a starting point, the new chief executive should contact all the company’s customers, old and new, to introduce him or herself and explain what he or she is doing. Rumours will abound, often false rumours put about by competitors, and so it is critical that this is done immediately to arrest any further unnecessary loss of sales. Uncertainty in the minds of customers, be they dealers or end-users, about the future of the company is a recipe for continued disaster. However, no firm that has lost credibility can expect to regain it completely overnight. Many of the remedial actions described in the following sections on marketing and manufacturing must be implemented and seen to work before confidence will be fully restored. As with rebuilding internal morale, nothing breeds success like success: while a successful turnaround will restore customer confidence, customer confidence is needed to execute a successful turnaround. To achieve Novell’s turnaround its new CEO, Eric Schmidt, accumulated thousands of air miles (once reportedly visiting five cities a day) rebuilding links with customers. ‘There is no substitute for taking the time and doing the travel required to meet our customers face to face and understand what they need from us,’ he said.

While customer confidence is critical, supplier confidence and that of other third parties can also be crucial if the suppliers’ own success is intimately linked to the recovery of the crisis company. In many high-tech sectors, such as computers, success is dependent on a network of third-party companies creating products such as software and peripherals to expand the use of the firm’s products. In a crisis situation, many of these firms – which themselves are fragile and may be overdependent on the fortunes of the crisis company – will quickly switch business focus, and abandon the crisis company. Quick management action is necessary to avoid the damage that this can do to the prospects of recovery.

Frequent and clear communication with the different customer, supplier and third-party constituencies is critical throughout the turnaround phase.

CHANGE OF BUSINESS FOCUS

The turnaround manager in a high-tech firm – usually the new chief executive – does not have the luxury of taking a few months to decide on the appropriate business strategy the firm should adopt. Apart from the four actions already discussed, which nearly all high-tech firms in crisis need to take if they are to recover successfully,
change of business focus through product-market reorientation is the most widely used recovery strategy. This should not be surprising, bearing in mind that four of the major causes of decline were product and price competition, changing market conditions and diversification.

The principal product-market strategies employed to reposition the company’s business are:

- focus on specific product-market segments;
- withdrawal from market segments;
- introduction of value-added products;
- shift of position in the value chain.

**Focus on specific product-market segments**

Choice of *what* product-market segments to compete in is always the critical question – only then can firms decide how they are going to compete in their chosen segments. The decision to compete in any segment, however, has to be based on:

1. the inherent attractiveness of the segment;
2. the extent to which the firm can develop a competitive advantage in that segment;
3. the firm’s capability to implement its chosen strategy.

Focus on a limited number of product-market segments is nearly always the recommended strategy, since the resource base is narrow and the natural management tendency is to try to compete in too many segments simultaneously. While product-market focus is important in nearly all high-tech turnarounds, management must balance the need for focus against the danger of being overreliant on just a few customers. Chapter 4 showed how firms frequently get into trouble because of the cancellation or delay of a major contract. The two objectives of focus and reducing reliance on a few customers need not be in conflict if the market segmentation issues are carefully thought through. What is required is to maximize product-market focus while at the same time ensuring as wide a customer base as possible. At Lattice Semiconductor, for example, Cyrus Tsui focused the business on the firm’s proprietary product line – generic array logic devices – at the same time as rebuilding the customer base so that no single customer provides more than 10 per cent of the company’s revenues. Similarly in larger-size high-tech companies, focus is often an obligatory path for a turnaround. National Semiconductors, a US producer of semi-conductor-intensive products and services, reduced drastically its number of products from 44 000 to 24 000 as it went through a turnaround from 1992 to 1994. At Apple Computer, Steve Jobs refocused on consumers, schools and creative professionals and cut back the number of product lines from 15 to 5.
Withdrawal from market segments

Withdrawal from one or more markets can take place either by divestment or by stopping all activities relating to a particular product-market segment. Where part of the business is a loss maker with little chance of developing a viable competitive position, it is clearly a drain on the small company's fragile resource base. Assuming the rest of the company's activities are profitable, divestment or closure are the only alternatives if the corporate entity is to survive. Divestment will always be the preferred option, even if for a nominal amount, due to the costs of closure. In some instances, organizational restructuring is advisable prior to the disposal so that the company can sell a 'division' instead of just part of its business, or a product line. Such restructuring is purely 'cosmetic' but sometimes makes the sale easier. The decision to close or divest a product line or business is typically based on a strategic assessment of the company's competitive position after taking into account both competitive forces and the company's capabilities. An analysis of competitive forces often shows that young high-tech firms, with their limited resources, are unable to compete with the 'big names' as markets begin to globalize, in which case early divestment would be preferable. A realistic self-assessment of the company's capabilities can, however, be more difficult to obtain. Only rarely can a firm be found that knows its limitations. One firm that did, diversified into CAD software through acquisition, but eventually divested the acquisition because the management realized that they 'only understood businesses with a sizeable hardware component, but not those that were totally dependent on software'.

Not all divestment is due to pulling out of loss-making businesses. In some instances the reason is given as the 'lack of fit' with existing businesses or lack of fit with the company's long-term strategy. In both cases, though, the underlying logic for divestment still rests on top management's assessment of market attractiveness and the company's limited capabilities.

Introduction of value-added products

Where one of the principal causes of crisis for the high-tech company is product or price competition, one common approach is to develop value-added products, either by enhancing the capabilities of existing products or by bundling together parts of the existing product range. Adding value to products may mean adding services to enhance the total product offering, or it may mean adding services to an existing service business. The most commonly used approach is when product manufacturers start to sell systems as their core basic products start to behave like commodity products. A systems approach involves a greater degree of differentiation and more customization, although it no longer guarantees success as it might have done ten years ago. Today, many of the largest high-tech companies have had to move to a
predominantly systems approach in order to maintain margins as whole sectors of
the electronics industry have become virtual commodity markets.

Shift of position in the value chain

Michael Porter’s book *Competitive Advantage* places considerable emphasis on
the need to analyze a firm’s value chain in order to understand the sources of the
firm’s competitive advantage or disadvantage.\textsuperscript{11} The value chain disaggregates a
firm into its strategically relevant activities in order to understand the behaviour
of costs and the existing and potential sources of competitive advantage. (A
detailed account of such analysis is beyond the scope of this book.\textsuperscript{12}) However, the
concept is useful in explaining one of the common strategies used by high-tech
firms to achieve business focus in a crisis – a shift in the focus of the firm’s
activities in the value chain. Typical shifts include turning the firm from being a
manufacturer into a distributor, greater use of subcontracting (particularly in the
area of manufacturing), and greater emphasis on selling services rather than
products. When a turnaround is needed, both small and large high-tech firms use
these strategies. IBM’s turnaround during 1993–1995 made use of all these shifts:
IBM stopped trying to produce all its own products and sourced ‘best of breed’
from third parties which it then distributed to its own customers. The company
also subcontracted manufacturing, facilities management, training, travel and
much else, and most noticeably in the revenue account it shifted its sales focus to
selling services, as shown in Figures 5.1 and 5.2.

\textbf{Fig. 5.1} Change in revenue make-up at IBM between 1990 and 1995
(shown as 1990 streams common-sized to 100%)
In a turnaround, management will want to know which of these strategies to follow. If the market in which the turnaround firm operates is at all competitive then a quick survey of what strategies are exploited by the successful competitors will be useful in this respect. For example, data from published accounts – see Table 5.2 – showed that most of IBM’s main competitors had been successful in exploiting services as a revenue generator, and none more so than EDS, a very successful IT business founded by former IBM man Ross Perot.

<table>
<thead>
<tr>
<th>IBM</th>
<th>18%</th>
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<tbody>
<tr>
<td>HP</td>
<td>16%</td>
</tr>
<tr>
<td>Microsoft</td>
<td>Negligible (but initiating a services offering in 1995)</td>
</tr>
<tr>
<td>GM (EDS and Hughes)</td>
<td>47%</td>
</tr>
<tr>
<td>Unisys</td>
<td>35%</td>
</tr>
</tbody>
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The shift in position is invariably towards emphasizing those parts of the value chain where the firm has a cost or differentiation advantage and pulling out of those areas where this is not the case. In a crisis the firm seeks to reduce risk as its resource base is eroded.
**IMPROVED MARKETING**

The installation of new marketing management is a prerequisite for improved marketing unless the chief executive is particularly inclined in this direction. Rebuilding credibility with customers is at the top of the priority list, but it is not marketing actions alone that will do this. Improved product development efforts and improved operations are often more important. What then, are the typical marketing improvements that must take place? There are four areas where changes are often needed:

1. Redefining the product proposition.
2. Increasing prices.
3. Improving salesforce management.

In seeking correct decisions in these areas, there are no simple rules that can be applied. The only right way is to start by thoroughly analyzing customer and (where appropriate) dealer buying behaviour. The elements of the marketing mix flow logically from such an analysis.14

**Redefining the product proposition**

A manufacturer of computer-aided communication systems for use in specific customer applications (e.g. telephone customer service departments in credit card companies) was meeting significant sales resistance. The company had confidence in the product since it undoubtedly made the users’ task much easier and improved efficiency. However, the marketing strategy had been to sell products direct to management information systems executives, who were reluctant to try an unproven technology. As the new CEO put it: ‘We are selling benefits, not systems. The company must sell to the users, people who can see the benefits of our products.’ The company persuaded customers to use the systems on a trial basis. Once the users themselves had enjoyed the benefits, sales increased.

This is a classic example of how the company had failed to analyze the needs of the end-users and the buying process within the customer’s organization. As a result, it was unable to *position* its product correctly within the chosen product-market segment. A manufacturer of in-flight navigational equipment, referred to in Chapter 4, had a similar problem. Through gimmicky promotional efforts like giving away cheap watches, the company was positioning its product at the opposite end of the safety spectrum from where it ought to have been. New management overcame this problem by giving the product an enhanced image with testimonials from its most prestigious customers.
Increasing prices

Since underpricing is one of the causes of failure, increasing prices is the logical answer. The new CEO of a Silicon Valley company designing and manufacturing integrated circuits for use as semiconductors commented: ‘The company had no clear strategy and sales and marketing had no clear understanding of the pricing issues or of the technology ... it was often selling the product for less than the cost of manufacture ... in some cases prices were raised over 250 per cent.’

A second company, which manufactured tape drives, suffered from the same problem. On arrival, the new CEO found that money was being lost on every unit of production – material costs were higher than prices. The marketing department insisted that prices could not be raised. The new CEO raised prices across the board by 50 per cent and no orders were lost.

Improving salesforce management

These are two issues which are critical to the high-tech firm: very careful targeting of the salesforce’s efforts on the existing and potential customers, and the recruitment, training and motivation of good, technically qualified salespeople. The issues are not unique and are faced by all companies using direct selling. However, implementation of changes in product-market focus and the importance of regaining customer credibility make both these issues particularly important for the small high-tech company. Lou Gerstner, the CEO of IBM brought in to operate a turnaround of the company in 1993, upgraded the quality of its 30,000 sales representatives and added a management consulting division led by experienced consultants, so that in future IBM’s people would as a group behave more as business consultants to customers, which would enable them, it was hoped, to sell them IBM as well as non-IBM systems solutions.

Changing distribution channels

Inappropriate marketing can sometimes mean the wrong channels of distribution are being used. The manufacturer of the in-flight navigational equipment mentioned earlier was, in addition to positioning the product wrongly, using an independent distributor. Independent distributors rarely provide enough push for a company’s products. They are not usually very good at understanding and hence selling advanced technological products – they are merely order takers. The navigational equipment manufacturer ended up by establishing its own salesforce which concentrated on face-to-face selling to pilots so that the product benefits could be stressed.

Unfortunately for some high-tech firms whose products need direct selling, the costs of establishing an in-house salesforce are too great, because the customer
High-tech Turnaround

base is too fragmented and the dollar contribution for the typical order size fails to cover the cost of the salesman’s visit. In such circumstances the company has to rely on distributors, but its chances of success are considerably reduced.

Following mounting losses and declining market share at Apple Computer in 1997, and the return of Steve Jobs, Apple reduced its number of distributors from double digits to two, reduced the number of Mac retailers and shifted 25 per cent of its sales to on-line.

MANUFACTURING CHANGES

In all the manufacturing companies in the study, the new CEO needed to institute dramatic changes to reduce costs or improve quality. Changes most commonly took place in four areas: process engineering, delivery, sourcing and plant capacity.

Changes in process engineering

One cause of quality problems is poor process engineering, i.e. bad design of the manufacturing process. For one company, the process technology problems were so great that the new CEO was forced to shut down the production line twice – the second closure lasting for three weeks. Task forces were set up to solve the technical problems. The CEO commented: ‘there was little point shipping product unless quality was good. Previously, people had felt that the company would go under unless product was shipped.’

The appointment of a new technical expert to improve the production process is the usual starting point of the manufacturing turnaround. Existing technical people will typically have had their chance to solve the problem. Beyond a certain point – and certainly not too far into the crisis – management must call on outside technical expertise to help solve their process engineering problems. This may well upset existing staff, but any delay is likely to have a significant negative impact on cash flow.

Establish targets to meet delivery dates

This is a necessary step where the ailing company has missed delivery dates. There is little chance of regaining lost customer confidence if delivery promises continue to be missed.17

Sourcing

In those product-markets where severe price competition develops – typically high-volume, electronic-based products – it is essential for the ailing companies’ survival to lower costs drastically. Off-shore sourcing is often the preferred route. In one
example, following the appointment of a new VP, operations, the company set about establishing an external manufacturing base. While it was identifying sources in Hong Kong and Taiwan, it used value engineering to reduce costs by 25 per cent. Improved processes cut a further 10 per cent, but moving off-shore brought the total reduction in costs to 63 per cent.

During 1998 and 1999 Apple Computer outsourced half of all its manufacturing including all printed circuit board production and outsourced its spare parts business. This has contributed to Apple reducing its production cycle from four months to two months and substantially reducing its inventory levels.

**Reduce manufacturing capacity**

Where the firm has been through a period of substantial growth prior to hitting a crisis and has developed multi-plant manufacturing facilities, a sudden drop in volume may mean plant closures are necessary to bring capacity in line with volume.

**INVESTMENT IN FOCUSED PRODUCT DEVELOPMENT**

The one area which top management tries to avoid cutting back in high-tech firms is the new product development function. Once a firm gets behind in product development, it is often very difficult to catch up. In theory, a firm can skip a generation of products and leapfrog straight into the following generation. While this may be feasible for a large company with vast financial resources, it is rarely possible for smaller firms since their technical people tend to develop new products incrementally.

The challenges facing the new turnaround manager in this area are threefold: understanding the technology, deciding what projects to focus on, and deciding how to speed up the process. Decisions in this area may involve the turnaround manager taking some significant risks. Expenditure on product development may have to increase significantly if the company has any chance of survival. Apple in the 1980s provides a good example. In John Sculley’s words:

> When many people weren’t sure we would even be profitable the following year, we also accelerated product development expenses by 70 per cent. Not only did we have to gain control of the company, we had to prepare for a successful future. That also led to our $15 million investment in a Cray supercomputer in January of 1986, at a time when the public wasn’t yet convinced that we had turned the company around. We bought the Cray to do simulations of future products to speed up the design of software development tools – to eliminate one of the reasons for the initial failure of the Macintosh.”18
Seeq Technology tells a similar story. Even in the bad times of 1986, 20 per cent of revenues went into research and development – an investment which started to pay off in 1987 as a new 256k CMOS E² chip was successfully introduced. The future of high-tech companies is critically dependent on product development and this usually plays a lead role in any high-tech manufacturing turnaround.

Concomitant with such investment must be increased focus of the development effort – cutting out projects where both the combined market and technological risk of success are too great. Care must be taken not to throw out important core technologies, but in most high-tech development departments there are a number of ‘pet’ projects which need eliminating on a regular basis. Some such projects may be true skunk works of the type favoured by writers on excellence and intrapreneurship, but few firms can afford such luxuries in a crisis. What is needed is to harness the ingenuity of the development team to solve the critical problems of the hour.

Speeding up the product development process is likely to be critical to turnaround success if the technology is not to leap ahead of the firm’s capabilities and the firm’s fragile and probably tentative market position is not to disappear altogether. Thus, one of the elements of Gerstner’s turnaround strategy at IBM in 1994 was to cut the updating cycle for workstations from 12-18 months to nine months.

FINANCIAL CHARACTERISTICS OF SUCCESSFUL TURNAROUNDS

An analysis of 20 smaller high-tech firms provides interesting comparisons between the financial performance of those companies that appear to have undertaken a successful turnaround and those that have not. (Although this analysis focused on smaller firms, the findings are consistent with one of the largest ever high-tech turnarounds, that of IBM under Gerstner in the mid 1990s.) By comparing accounting data for three years before and two years after the crisis year, the following characteristics emerge for successful turnarounds:

- Dramatic sales growth occurs within two years of the crisis point. Sales growth usually stops or declines slightly in the year prior to the crisis for all companies, but those that recover experience rapid sales growth after the turnaround. The sales growth is particularly strong in the second year after the crisis. In the failed recovery situations sales, perhaps not unexpectedly, continue to decline sharply (see Figure 5.3a).

- Profits bounce back immediately. Successful turnarounds are characterized by a severe drop in profits in the year prior to the crisis, but the turnaround is
Debt levels are sharply reduced in the first year of the turnaround. Although small high-tech firms generally have relatively low borrowing levels due to the risks involved, debt levels do rise in the run-up to a crisis. What is noticeable, however, is that the successful recovery situations are those where the debt levels have been held steady in the year prior to the crisis, whereas in the failed situations, debt has continued to increase (see Figure 5.3c).

The fixed asset base is expanded quickly. In the year prior to the crisis, fixed asset investment has usually stopped. After the crisis, the recovered firms are able to expand on the back of their return to profitability, while those firms that continue in a crisis reduce their fixed asset base (see Figure 5.3d).

Inventory levels are reduced sharply before the end of the crisis year. Firms which failed to recover continued to increase stocks up to one year after the crisis before making very rapid adjustments (see Figure 5.3e).

Receivables (debtor days) are reduced during the crisis year to normal levels, and controlled thereafter. Failed turnarounds, however, show a different pattern. Receivables are reduced to normal levels during the crisis year, but then control disappears and receivables jump sharply. In the study’s sample, receivable days outstanding increased 80 per cent in the year following the crisis year for failed turnarounds (see Figure 5.3f). It seems that customers are reluctant to pay their supplier once it becomes widely known that the firm is in deep trouble.

Payables (creditor days) are also reduced to normal levels during the crisis year. It is noticeable that the successful recovery situations tend not to extend their payables dramatically in the two years prior to the crisis year, whereas the failed turnarounds have doubled the length of time they take to pay their suppliers in the two years prior to the crisis and are forced to extend payables even further as they fail to recover.

Chapter 4 discussed the various reasons why small high-tech firms get into crisis so quickly. However, what is interesting is the speed with which some of them can get out of trouble. At Seeq Technology, for example, the company lost $24 million on sales of $30.5 million in the year ending 20 September 1986, but in the following year made a profit of $2 million on sales of $44.6 million. The speed of turnaround is helped by the fact that most serious attempts at turning around small high-tech companies are accompanied by an injection of additional finance which allows loans to be reduced, the situation regarding payables and receivables to be rectified, and further investment in fixed assets where appropriate. However, refinancing is obviously insufficient by itself.
**Fig. 5.3** Comparison of financial performance of successful and unsuccessful turnarounds of small high-tech firms*

* Based on average accounting data for 20 firms for three years before and two years after crisis. All averages for years prior to and after the crisis year (year zero) expressed as a percentage of the average in the crisis year.

**FACTORS DETERMINING SUCCESSFUL RECOVERY**

Five factors determine the likelihood of implementing a successful turnaround of a high-tech firm:

1. The use of many strategies simultaneously.
2. The causes of decline.
3. Industry characteristics.
Turnaround strategies

4 The core technological competence within the firm.
5 The speed and vigour of implementation.

The use of many strategies simultaneously

Successful turnarounds need simultaneously to use most of the eight strategies discussed earlier in this chapter. The two case studies later in this chapter summarize the nature of the strategies adopted at Novell and Seeq Technology. While the details of the strategies differ, the overall approach is similar in each situation – the simultaneous implementation of seven or eight basic strategies.

There is little difference between the basic strategies used by different types of high-tech firms; any differences tend to be ones of emphasis. In service firms, for example, senior management is more likely to be bolstered rather than removed in a crisis because the original founder is less likely to have given up majority control to outside investors, as service businesses are less asset-intensive. Perhaps the most noticeable difference in emphasis is between the recovery of fast-growth and slower-growth companies. In fast-growth situations, there is usually a more fundamental shift in organization structures, systems and culture as new management takes the opportunity of dealing with the inevitable strains on the organizational systems which are characteristic of fast-growth situations.

The causes of decline

In the earlier research into the turnaround of non-high-tech companies, it was found perhaps not unexpectedly – that there was an inverse relationship between the number of causes of decline and the chance of success: the fewer the causes, the more likely the chance of success. For high-tech firms this relationship does not appear to hold true. As we pointed out at the end of Chapter 4, a single cause of decline can just as easily lead to crisis as multiple causes. It appears that, on average, there is little difference between the number of causes of decline among firms that recover and those that do not. In trying to look at the influence of causes of decline on the success of recovery strategies, the single most important issue that stands out is the influence of severe product competition on the firm’s likely chance of recovery. Most common is competition with the firm’s second-generation product. If one of the firm’s basic problems is failure to generate a robust second-generation product, there is usually little that can be done to salvage the company.

The market sector characteristics

Within the broad definition of high-technology industries used in this book there are many different industry sectors with distinctive competitive market and
technological characteristics. These many and varied characteristics determine both the likelihood of success and the speed at which it can be achieved. The principal characteristics to be considered include the following:

- **Market growth rate.** The faster the growth rate of the firm’s markets, the easier the turnaround. Turnarounds are difficult in emerging markets.
- **Degree of market segmentation.** A more fragmented industry or more segmented market provides more opportunity for refocusing the business.
- **Competitive situation.** The absence of large, powerful competitors makes turnaround easier for the smaller company, although low barriers to entry may make developing a competitive advantage difficult.
- **The nature of the product.** A firm with more differentiated, less price-sensitive products is easier to turn around than one whose products are rapidly moving towards commodity status.
- **Powerful customers.** The absence of powerful customers makes price increases easier to implement.
- **Substitute technologies.** Firms competing against cost-effective, substitute technologies find turnarounds more difficult.
- **Lead times.** Firms manufacturing capital goods face long lead times to win orders and sometimes long manufacturing lead times as well. Such a situation is extremely difficult to turn around since a prolonged period of negative cash flow is inevitable.
- **The business cycle.** Economic downswings are always a problem for firms making and servicing capital goods. The effect on other firms will vary, depending on the rate of growth of the market at the time the downswing occurs.

**The core technological competences**

Since technology is at the root of the high-tech firm, even if it is a service business, the firm’s future is intimately connected to its technological competence. The need to invest in new product development is an integral part of most recovery strategies and is sometimes central to recovery (as it was, for example, at Seeq Technology). Not surprisingly, therefore, product development is often the only area not cut back in a crisis. In theory, firms can buy in new competence if it is lacking, but two problems make this difficult. First, good product development people are difficult to recruit if the firm is in a crisis. Bad news travels fast and nobody wants to join an obviously risky situation. Second, it takes too long to recruit a new team and bring it ‘up to speed’ with the particular product technology. Speed of new product development is critical, hence the need to build as far as possible on the existing in-house competences.
Firms that rely on third-party technology often provide little added value. While the market is growing fast they can be profitable, but as soon as a more competitive situation emerges, crisis rapidly ensues. These companies are near impossible to turn around as there is no core capability on which to build.

The speed and vigour of implementation

Turnaround management always requires quick decisions and vigorous implementation, but nowhere is this more true than in a high-technology turnaround. The intellectual property assets of any but the largest high-technology company often have short half-lives, and much of the value of a high-tech firm resides in the people, who will leave a sinking ship fast if they possibly can. Once a company is known to be in trouble negative market sentiment establishes itself quickly and makes sales harder, deters the best people from joining and, worst of all, raises the costs of financing. Failure to implement the turnaround strategy quickly will mean that management may have to spend time and attention on yet another round of emergency financing instead of on more value-creating activities such as stabilizing the customer base, exploiting new markets or general sales activity. This situation becomes very difficult to manage and if the downward spiral is not arrested by fast and vigorous management action the point will probably soon be reached at which there is nothing left to salvage.

**Case study**

**Crisis and recovery at Novell**

Founded in 1983 in Utah, Novell built a sizeable reputation on its networking nous – its ability to get computers talking to each other. But it lost the plot when it attempted a David and Goliath-type slugging match with Microsoft in the early 1990s by moving onto Microsoft’s home turf of personal computer software and operating systems. The acquisition of several companies such as Wordperfect fragmented the company focus and its cohesion. Going head to head with Microsoft, but without its rival marketing strength, Novell lost its market lead and tremendous amount of goodwill amongst its customers. In 1997, Novell reported a loss of $122 million and many of its senior management left. Novell’s half share of the network operating systems was slashed to just 27 per cent.

Eric Schmidt, former chief technology officer with Sun Microsystems, was appointed to provide the much needed leadership. ‘The company lacked the clarity of direction and strategy that are essential for software companies to sustain growth. The basics were there in terms of top networking technology and a highly skilled human resource, but Novell had lost its way,’ he said in *New Zealand Management* in June 1999.

Schmidt embarked on three key initiatives: aligning the business with the marketplace reality, including a cost-cutting exercise that reduced employee headcount by 20 per cent; focusing the company’s strategy back on to the Internet and its product line back on its networking and directory strengths; and delivering new directory-based products such as...
High-tech Turnaround

NetWare 5 ahead of schedule. The emphasis swung away from competition to integration and Novell struck agreements with major infotech suppliers such as IBM, Compaq and Oracle to help establish its directory services (NDS) as the cross-platform industry standard.

In 1999, after a two-year turnaround, after-tax net income was $191 million, up 87 per cent from the year earlier. Novell had regained most of its credibility and was now shipping on schedule.

However, the turnaround lasted as long as the Internet bubble and, for the first quarter of 2001, Novell reported a loss of 48 cents per share, including a $142 million write-down. Novell shares had peaked at $34.56 in March 2000 before falling to a 52-week low of $4.75 in January 2001, a few weeks before Schmidt was replaced.

Indeed, Novell continued to be dominated by executives schooled in the art of selling its NetWare operating system, not the Net-friendly programs such as Novell’s directory services that Schmidt wanted to push as the company’s new focus. ‘Novell has persisted in using a business model that worked very well for them in the 1980s,’ said Dan Kusnetzky vice president for systems software at IDC, a technology forecasting company. Novell tried to encourage reseller partners to advocate its products, but Microsoft bypassed that route by convincing the customers to ask for Microsoft products instead.

‘In hindsight, the channel issues we faced after the Year 2000 were a surprise to me and I should have seen this coming. I didn’t. It has taken longer than I expected to work through them – about a year! It has taken longer to build the sales and solutions capacity for the directory strategy than I expected,’ said Schmidt.


Case study

Crisis and recovery at Seeq Technology

Seeq Technology was founded in 1981 by former Intel employees, led by Gordon Campbell. They planned to make memory chips known as EEPROMS (electrically erasable programmable read only memories) or E-squares, in the belief that these superior chips would take over the $600 million market held by the older EPROMS.

Seeq raised $50 million in venture capital and a further $18 million in 1983 in a public stock offering. Dataquest, a leading Silicon Valley research house, predicted that the E² market would grow to $1 billion by 1987. Seeq built up the company to support that market size.

Problems began early on. Seeq was a year late in shipping its first product. Intel filed a lawsuit against the company, claiming that the founders had taken valuable technology with them when they left. By 1983, Seeq’s salesforce realized that selling the E² was going to be more difficult than they had anticipated. Seeq had built its manufacturing facility to serve a $500 million market, but it was turning out to be only around $60 million.

The biggest buyers of chips, the data processing companies, just were not interested. J. Daniel McCranie, who became CEO in 1986, said in Forbes magazine (19 April 1988):
'In interviews, [Seeq] management would give all these occult reasons why the E-square market wasn’t growing. Like the lack of standardization. That was baloney. The reason the market wasn’t growing was that E-squares were, on average, five times more expensive than EPROMS. It was felt that innovation would occur, and the next thing you know E-squares would cost no more than EPROMS. That didn’t happen.’

Seeq management knew they had to produce some revenue, so in 1984 they decided to begin making the older EPROMS in addition to the E-squares. Seeq’s revenues increased dramatically, from $9 million in 1983 to $43 million in 1984. But the good times were short-lived. Japan began flooding the market with chips, and between the last quarter of 1984 and the third quarter of 1985, the price of a standard 128k EPROM fell from $15 to $2. Seeq, which relied on EPROMS for 75 per cent of sales, was making them for $5.

Campbell had left the company in the autumn of 1984. His successor lasted less than a year and was followed by a three-man ‘office of the president’. In March 1986, McCranie took over as CEO. He inherited a company in trouble. By May of that year, Seeq was down to $13 000 in the bank, and in the year ending September 1986, the company lost $24 million on sales of $30.5 million. Drastic action was needed to save the company.

The workforce had shrunk from a peak of 700 employees to 400, but McCranie felt it needed to be reduced further. Returning from the 4 July holiday weekend, he told managers to lay off a further 130 people and to do it that afternoon, not the following week. This cut the weekly payroll from $310 000 to less than $200 000. They were able to keep the best people, but morale was low. Experienced R&D technicians were assigned to rote work in wafer fabrication, resulting in a jump in productivity. McCranie told these employees that their sacrifice was necessary to keep the firm alive.

McCranie next moved to cut back on other expenses. He renegotiated all of the plant and equipment leases, effectively reducing payments by 50 per cent; in return, he offered warrants to the lessors, allowing them to buy stock in the company. Excess building space was released. Almost every segment of the company was sliced, except R&D. Seeq got out of the EPROM market, except for a small profitable segment.

To raise cash, McCranie sold 14 per cent of Seeq to Monolithic Memories for $4 million and agreed to a four-year joint-technology programme. A further $2 million was brought in by a joint-development deal with Motorola.

McCranie knew that the future of the company depended on product development. Even in the bad times of 1986, 20 per cent of revenues went to R&D. In 1987, that development began to pay off. A new 256k CMOS E2 chip began to sell briskly. Flash E2 chips also went into production, costing one-quarter of what the full-featured chips cost. Seeq began to make money again in the first quarter of 1987. For the year, it netted $2 million on sales of $44.6 million. At the end of the year, it had $13 million in the bank.

High-tech Turnaround

Case study
The world’s biggest high-tech turnaround, IBM 1993–2001

In the 1960s and 1970s, IBM was successful and was the epitome of corporate America. Its success persisted though the early 1980 but then began to wane. In 1992 IBM made a record loss of $5 billion. Customers at the time felt that IBM had failed to understand the personal computer (PC), which IBM had popularized and commercialized (although not invented), and customers and some insiders felt that senior management had become more interested in IBM’s internal politics than in IBM’s customers. There also seemed to be little accountability for meeting financial targets. The strategic response that IBM management came up with was to break up the corporation. Corporate break-ups were fashionable at the time. The board of IBM had other ideas, and recruited an outsider, Lou Gerstner, then aged 50, to turn around IBM. Gerstner had a very solid career in corporate America, including time at Proctor and Gamble and McKinsey. (By the mid 1990s he was affectionately known as ‘that soap powder salesman’ by IBMers.)

The IBM that Gerstner found has been described as ‘a beach strewn with uncut precious gems.’† This was a reference to the contrast between the incredible technology that IBM had in its research labs and the very able and highly qualified people on the one hand, and the lacklustre and technologically stodgy products and services that came out of IBM on the other. For example, even in 1995 most IBM senior managers did not know much about the Internet and many believed that the Internet would have zero impact on the IT world. But at the same time IBM was supplying a significant part of the Internet infrastructure and in its laboratories Nobel laureates and others were working on Internet technologies. In hindsight many IBMers who experienced the Gerstner transition believe that there were two main levers of change used by Gerstner. One was a cultural change to make people customer focused, the other was a change to increase levels of accountability.

Before Gerstner put his stamp on IBM, it was not unusual to find that a senior manager would choose to attend an internal IBM meeting or a meeting to do with PR at the expense of making a customer meeting. And what senior management did, other IBMers followed. Gerstner reminded everyone that the customer comes before internal meetings, and he led by example. He would frequently cancel press appointments and internal meetings at the last minute if a meeting with a customer or a potential customer came up. And others in IBM followed Gerstner’s example. For example, in 1997 a junior manager in IBM’s Capital Markets practice ordered half a dozen PhD mathematicians out of their research laboratory in upstate New York and into a client’s office in Manhattan. This was unprecedented. Until then the researchers had been regarded as a cost centre, not the kind of asset that could be billed out at a daily rate. The researchers at first felt a little uncomfortable working shoulder to shoulder with the IBM client, but soon started to enjoy it. Their team were converted within six weeks from being a cost centre to being a profit centre. IBM’s cumbersome bureaucracy suffered considerable indigestion in doing this, but it was the right thing for the customer, who was very satisfied with the work done by IBM’s mathematicians because it led directly to a massive increase in profits, and this meant that it was also the right thing for IBM. Getting the mathematicians out of the labs and into the client is just one particular example of a change in mindset at IBM under Gerstner, and the combined effect
of the thousands of such examples that happened under Gerstner were the immediate cause of IBM's turnaround.

One of the difficulties faced by Gerstner was the sheer size, diversity and complexity of IBM. Even when he took it over in 1993 IBM's revenue and balance sheet meant that it was half the size of Turkey's economy. IBM was organized into five divisions:

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<tr>
<th>Division</th>
<th>1993 revenue, $m</th>
<th>1995 revenue, $m</th>
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<tr>
<td>Hardware sales</td>
<td>30 591</td>
<td>35 600</td>
</tr>
<tr>
<td>Services</td>
<td>9 711</td>
<td>12 714</td>
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<tr>
<td>Software</td>
<td>10 953</td>
<td>12 656</td>
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<tr>
<td>Maintenance</td>
<td>7 295</td>
<td>7 409</td>
</tr>
<tr>
<td>Rentals and financing</td>
<td>4 166</td>
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Overlaid on the divisional structure was matrix management and national management. The head of banking consulting services in the UK was responsible for selling banking consulting services into London, the world's premier international financial system. This individual spent most of his time dealing with his national boss in IBM UK, his regional boss in Paris where IBM's EMEA headquarters were, his IBM Services boss, his IBM Hardware Sales boss, his consulting group boss in the USA, and a few people from various support functions within IBM. The individual concerned at first had very little time left over either to manage his fast-growing consulting practice nor to talk to customers. However, as the Gerstner effect trickled down the organization, things improved; for example, the EMEA headquarters bureaucracy in Paris was simply sidelined, and an industry-focused restructuring helped cut down other internal bureaucracy.

IBM's headcount had been just short of 400,000 in 1991, but as IBM's problems mounted headcount was cut back to around 300,000 by 1993 when Gerstner arrived. Under Gerstner cuts continues for around a year, although more shallowly, and by 1995 headcount was back up to 1993 levels, although with a marginally higher proportion of other then permanent employees (contractors and fixed-term employees). (The British Army at the time fielded fewer than 100,000 soldiers.) One former employee described trying to get anything done in IBM as 'like trying to run when waist deep in treacle', but a year later added that 'the effect of Gerstner was to heat up the IBM treacle by insisting on revenue and real customer satisfaction, and the treacle at least became less viscous'.

But not all the problems faced by Gerstner were internal to IBM. In the early days of corporate computing hardware not software was what mattered and both hardware and software in the commercial IT market tended to be proprietary designs, which enabled suppliers to maintain high margins and avoid having to make their computer systems work easily with equipment from other suppliers. However, in the 1980s a combination of the US government's anti-trust action against IBM, technological advances and increased buyer awareness led to the commoditization of the IT market. The paradigm example of this change was that before commoditization the corporate buyer wanted an IBM PC, i.e. a box made by IBM, whereas after commoditization the corporate buyer did not care who made
the box as long as it ran Microsoft Office. A crucial insight of IBM under Gerstner was that there was a huge problem that resulted from commoditization, and that the problem presented a huge opportunity to save IBM. In the commoditized IT world corporations were buying more and more IT systems but these systems were working less and less well together. Giant and reputable companies such as American Express would send out a letter to a customer thanking him for being an excellent customer and offering a higher credit limit one day and the next would send the same customer a letter threatening legal action because the account in question was a day late in being paid, never mind that the sum at issue was a mere £5. This kind of problem irritated customers immensely and was caused by corporate IT systems not talking to each other. Another example is from banking, where qualified accountants at £30 an hour would be employed to re-key data into a system owned by the bank from a printout generated by another computer owned by the bank. Gerstner knew about this problem first hand because he had held a senior appointment at American Express, and no less importantly under his leadership IBM began making many external hires to senior positions who also recognized this problem and realized its implications for IBM’s customers, in contrast to the less interested view of some of the longer-term or ‘legacy’ employees of IBM at that time. Gerstner decided that IBM would not just sell IT equipment to the corporate world, but it would help them sort out and manage the complex problems of their IT as a whole.

To make the strategy work Gerstner changed the way that IBM’s people, processes and systems worked. He changed the mindset of the people by appointing some outsiders to key positions and by changing the executive compensation scheme, and in particularly he increased the proportion of options in executive pay to encourage managers to behave more like shareholders. IBM’s processes were changed to improve the co-ordination across divisions in servicing the needs of a customer – the example, above, of mathematician researchers being pulled out of a research laboratory and injected into an IBM customer was the result of this kind of process change. Another example of a process change was the way that capital was allocated within IBM. Before Gerstner, executives would pitch for resources to IBM management in an elaborate and theatrical ritual in which they used overhead transparencies. Gerstner changed this and instead of a live presentation he required a written business case and, in another break with IBM tradition, implemented a measurement system to track actuals against projections for the cases that were approved. The most iconoclastic change made in the systems sold was that no longer would IBM necessarily sell an all IBM solution. IBM exited the production of many products and services where it had weak offerings – weak in market terms, that is, not necessarily weak in terms of pure technology. An example of this is that IBM gradually exited the PC operating system market and abandoned OS/2. Instead IBM would recommend its competitors as suppliers of elements within a total solution designed by IBM. In this way IBM might no longer recommend a solution to a customer comprising 100 per cent IBM products and services, but might instead recommend a better solution with 60 per cent IBM products and services and the remainder from direct competitors. This strategy worked. It worked for four reasons. First, it enabled IBM to offer better solutions. Second, it played to IBM’s strengths in terms of size and broad-based technical expertise, because only a very large and broad-based technology company had the capability to put together such heterogeneous solutions for
customers – Microsoft, for example, simply lacked the management consulting and hardware expertise to compete in this kind of offering; and the reason given for Hewlett-Packard’s attempted merger with Compaq in 2001/02 is that it is one of the few ways that H-P can achieve the diversity of technical capability necessary to emulate IBM’s Global Services strategy. Indeed, Kike Capellas, chief executive of Compaq is on record as saying ‘IBM’s is the strategy we emulate’. Third, by exiting products and services in which it was weak and replacing them by alliances with firms who had market leadership in particular areas, IBM was able to sharpen its focus and reduce wastage of management time and shareholder’s capital on suboptimal businesses; and fourth, IBM reduced the likelihood of a repeat of the anti-trust action to which it had been subjected before Gerstner joined, and to which Microsoft was subjected in the early 2000s.

Andy Grove, chairman emeritus of Intel, summarizes IBM’s success under Gerstner thus: ‘The key to IBM’s success with its services business is that it wraps things around commodity products that differentiates them. Every other computer company has now adopted as its primary objective to be more IBM-like. It’s kind of interesting that this service-driven strategy, an idea everyone else is now copying, came from an outsider to this industry.’††

Gerstner retires from the CEO’s role at IBM in 2002. Will his turnaround of IBM last? Commentators see reasons that it will. For instance, in the recession of 2002 IBM’s customers want to reduce the number of IT suppliers that they deal with. IBM’s positioning has been such that it is more likely than any other company except Microsoft to be removed from any list of preferred corporate IT suppliers.

<table>
<thead>
<tr>
<th></th>
<th>1993</th>
<th>2002</th>
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<tbody>
<tr>
<td>Market capitalization, $bn</td>
<td>30</td>
<td>186</td>
</tr>
<tr>
<td>Net profit, $bn</td>
<td>(8)</td>
<td>8</td>
</tr>
<tr>
<td>Per cent of revenue from services</td>
<td>27</td>
<td>41</td>
</tr>
</tbody>
</table>

From the vantage point of 2002 it is easy to say that Gerstner has done a first-class job of turning around IBM. The difficult judgement call was in the early Gerstner years, before it was obvious that IBM had been turned around. The IBM turnaround under Gerstner was notable because the strategy adopted in 1993 was implemented effectively and has held good for at least a decade.


**SUMMARY**

This chapter has discussed the eight recovery strategies commonly used by small high-tech firms in a crisis situation. They are:
High-tech Turnaround

1 appointment of new management;
2 strategies to tackle the cash crisis – tight financial controls, additional financing, cash and asset-reduction programmes;
3 improving employee morale;
4 regaining customer credibility;
5 changing business focus;
6 improving marketing;
7 manufacturing changes;
8 investment in focused product development.

The speed and magnitude of high-tech turnarounds can be quite staggering. Fragility may mean fast decline into a crisis, but can equally mean rapid growth in sales and a dramatic turnaround in profitability. Successful turnarounds are characterized by the implementation of seven or eight of the basic strategies simultaneously.

Four factors appear to influence the likelihood of implementing a successful turnaround: the causes of decline, the market sector characteristics, the firm’s core technological competence and, above all, the speed and vigour of the implementation effort.

Notes
5 Eastman Kodak financial report.


18 Sculley, J. and Byrne, J. Odyssey, ibid., p. 265.


The implementation challenge: managing the people

- The high-tech employee  154
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Turnaround management always requires quick decisions and vigorous implementation, but nowhere is this more true than in a high-tech firm. The firm typically has few assets apart from the skills and expertise of its people, who will leave the sinking ship fast if given half a chance. Profits can turn into horrendously large losses in a matter of weeks, with the company moving into a negative net worth situation at astonishing speed. Failure to implement quickly will make recovery extremely unlikely unless yet another round of finance can be found. This becomes extremely difficult as the firm’s technology and market positions erode to the point at which there is nothing left to salvage in the company.

Action plans need to be developed for each of the eight turnaround strategies identified in the last chapter. As with virtually all turnarounds, new management need to take action on many fronts simultaneously and to implement a recovery plan in a determined and sometimes drastic way. As with conventional, non-high-tech turnarounds, there is a need to be almost ruthless in the implementation of the strategies. A slight adjustment to existing strategies is almost never adequate – drastic action is required to pull the company out of crisis. Thus, when implementing a cost-reduction strategy, for example, it is almost always necessary to take more costs out than may seem practicable at first glance. Thus, when J. Daniel McCranie took over as CEO of Seeq, he had to reduce headcount by an additional 130 people on top of the 300 who had already been laid off out of a total workforce of 700. Turnaround managers should not be afraid to shrink drastically the size of the firm in an effort to save the business from insolvency.

Speed of action is even more essential than in conventional turnaround situations, due to the extreme fragility of the technology-based firm. Chapter 4 showed how firms can get into trouble extremely quickly and lose a phenomenal amount of money very rapidly. There is, therefore, little time for analysis before ‘life and death’ decisions concerning the future of the company have to be made. A rapid assessment of the situation is necessary, and since most small firms are relatively simple businesses, this need not be a problem for an experienced manager. The high-tech firm rarely has the luxury of going through the implementation phases of analysis, emergency actions and refocusing in a sequential order. In conventional turnarounds, emergency actions – asset reduction, refinancing, cost reduction and tighter financial controls – are usually necessary before a complete turnaround plan has been produced, and may indeed be implemented before any detailed analysis of the situation has taken place.

Experienced turnaround managers often know what action they are going to take prior to their arrival at the crisis company. Strategies which involve product-market refocusing, investment and organization building typically come after the emergency phase in the implementation time scale. This cannot be the case for the high-tech firm. The turnaround manager has to implement new strategies in these areas simultaneously with the traditional emergency strategies. The reason for this is that the nature of the crisis facing high-tech firms is different from that facing conventional firms in four ways:
1. They lose credibility with their customers at a phenomenal rate.
2. They suffer from product competition.
3. Product quality problems are often a principal cause of decline.
4. Employee morale declines extremely fast.

Some or all of these problems are present in every crisis, with the result that immediate action is necessary if the company is to have any long-term future. Finding and implementing the appropriate strategies to rectify these problems is more difficult. Strategies such as cost and asset reduction are relatively straightforward to formulate and implement, but strategies that involve new product-market directions and revitalizing the organization are more difficult. It is not always obvious, particularly in the absence of adequate market and competitor information, to know what segments to focus on, yet the organization needs a vision of the future from the chief executive if morale is to be re-established. It is the so-called ‘soft’ issues – changing employee attitudes, changing the corporate culture and the nature of the communications that take place between management and employees – which appear to be more important in the high-tech company.

The characteristics of high-tech companies that were discussed in Chapter 1 create a unique set of organizational values and management requirements. A large portion of the staff typically have some engineering or scientific background, and the average age in many companies is under 30. At the age of 23 Marc Andreessen led a team of programmers that created Netscape Navigator, an Internet browser that revolutionized the use of computers. The organization is usually informal, egalitarian and has built up a distinctive culture and management style. Successful turnaround management of these firms requires a somewhat different approach from that which is commonly found either in more traditional business environments or even among other knowledge-based workers.

**THE HIGH-TECH EMPLOYEE**

Most experienced managers of high-tech firms instinctively recognize that their employees are a special breed with unique needs, who create distinct demands on the organization. In contrast to this instinct, so far there has been little hard evidence of exactly how these employees are different. The typical employee is under 35 years of age, and in many companies the average is below 30. There is a very high level of education, with a high percentage holding first degrees and many holding higher degrees, particularly in the more advanced technology companies. It is the preponderance of technical professionals, scientists and engineers that makes the management of high-tech firms different. Besides being intelligent and well educated, the technically oriented personality has been described as serious,
socially reserved, overly engrossed in his own ideas and projects, possessing poor interpersonal skills, having a high achievement orientation, showing concern for career advancement and being uncomfortable in making quick decisions on the basis of sketchy information.3

The motivation profile of employees working in small and medium-sized high-tech firms differs in some significant ways from that of knowledge-based workers generally, and from employees in very large high-tech firms. A study of UK software firms found that the employees wanted money, a comfortable lifestyle, recognition and autonomy, but were less motivated by job security and power and influence over others.4 It is this combination of motivating influences that gives the high-tech employee considerable job mobility. The high-tech employee appreciates motivational investment to the same extent as anyone else. However, they are especially interested in investments that are clearly tied to performance.4 The combination also reflects an expectation on their part for a high-quality working life in terms of amenities and attractive physical surroundings.6

The UK study showed that the profile remained similar across both small (less than 50 employees) and medium-sized companies, although in the very smallest companies employees were prepared to trade off some money and comfort for greater autonomy. However, the most important aspect of the motivation profile is that it is quite different from that of any other type of employee. Individuals who are considered very high achievers in large organizations, for example, trade off money and comfort for greater recognition, power and autonomy.7 The small high-tech employee is different: he or she wants a combination of money with recognition and autonomy.

The implication for turnaround managers of high-tech firms is that employers cannot expect the psychic compensation derived from recognition and autonomy to compensate for lower salaries. The typical high-tech employee wants ‘to have their cake and eat it!’ – but is this possible in a turnaround?

The relatively low emphasis which high-tech employees give to power and responsibility partially reflects a psychological make-up of those attracted to work in high-tech firms,8 as well as social trends among younger people for whom self-development in the form of autonomy and creativity is more important than power and influence.9 This lack of desire for power and influence reflects itself in the difficulties firms face in finding technical staff who want to be managers. In fact, too strong a desire for power and influence would probably not be an appropriate profile for managers of people who require a lot of autonomy and very little security and structure. This may well be a cause of some of the problems high-tech firms encounter when they hire managers with big-company experience when the firm grows.

The different and possibly unique motivational profile of many employees in high-tech firms indicates that management practice and styles need to be different.
High-tech Turnaround

JOB EXCITEMENT, MOTIVATION AND SATISFACTION

One of the most noticeable characteristics of the successful high-tech firm, particularly the successful ones, is the degree of excitement in the air – the ‘buzz’ of the place. As an outsider, one does not see a self-satisfied group of employees going about their tasks in a routine way, but a group of employees who are alert, committed and operating with high energy levels.

In understanding the management problems of growing high-tech firms, Garden recognized three different aspects of motivation:10

- **satisfaction** – the state in which employees’ basic needs are fulfilled, but a low-tension state reflecting contentment;
- **motivation** – reflects a more positive attitude towards works and satisfaction, if not an eagerness towards work, but without the more highly charged feeling;
- **excitement** – the peak level of motivation.

The distinction between satisfaction at one end of the spectrum and excitement at the other is an important one, since the task of satisfying employees may be different from the task of keeping them excited. The spirit of excitement in a successful high-tech firm is not obtained by people being satisfied. Observation shows that staff in the most successful high-growth, high-tech firms feel exuberant, excited in their work, energetic, hyped up at work and get a buzz out of their job. There is something over and above enjoying work and being ‘motivated’.

The variables over which management have control which are associated with job excitement did not appear to be the same as those associated with overall satisfaction. Garden’s study of small UK software firms identified the critical management variables which are associated with job excitement, motivation and satisfaction.11 Most of the significant satisfaction variables were found to be things that the company gave to the employee, such as opportunities for advancement, sufficient resources and good communication from management. The variables associated with job excitement were very different and reflected the individual contributing to the company and achieving something useful, employing his or her talents to the full in challenging work. In short, excitement involves ‘the resources of the individual being fully used, not the resources of the company being given to the individual’, as with satisfaction.12

Excitement for employees in smaller high-tech firms is likely to differ from that in the largest technology-based firms such as IBM or Hewlett-Packard. In the larger firms a degree of organizational slack is built in to encourage innovation. In small firms, which are resource constrained and likely to be development or applications oriented (instead of research oriented), Garden’s work tends to indicate that creativity, time to explore ideas in depth and freedom in adopting one’s own approach are not seen by employees as being very significant.
In a crisis situation, motivation and job excitement disappear rapidly, with the result that by the time a turnaround manager arrives, employees are often far more disillusioned than employees in a non-high-tech turnaround. The leadership skills of the turnaround manager are paramount. He or she must deal with the situation extremely quickly, provide a credible vision of the future and restore employee motivation and, if possible, excitement. The firebrand autocratic (command and control) turnaround manager can easily lose the key technical resources required for a successful turnaround if he or she fails to understand these critical softer issues.

Recruiting and training staff

Attracting high-quality employees is generally recognized as critical for the success of a high-tech business since the business has few resources other than its people. This is most clearly true of smaller high-tech companies, but it applies also to the new business units and especially new, highest-tech business units within larger high-tech companies. The quality of the technical staff is particularly important, given the key role product development plays in the success of these firms. In the case of biotechnology companies, Glenn Crocker, head of biotechnology at Ernst & Young LLP, a professional services firm, says that finding good people is important, ‘particularly after the first couple of years of development. Often, if a company is at the seed financing stage, VCs are able to provide a lot of the executive input, either directly or through their network, but when a company has progressed through the initial phase it is vital that it has a strong team on board – particularly if it wants to raise funds.’

Such findings are revealed in a number of reports, such as one that Crocker authored in 2001, which covered 250 UK biotech firms and found that these firms believe very strongly that recruitment and development of top scientists is a key to success. (The firms covered by the report include Acambis, a vaccine maker in Cambridge, Powderject, a vaccine firm in Oxford, Vernalis, Celltech, and Shire Pharmaceuticals.) The report found that for many years the lack of management with the necessary experience and skills has been a major limiting factor in the development of the European biotech industry, but it also found that recently a relatively new breed of individual, the ‘serial biotech entrepreneur’, has evolved and is adding significant value to the UK biotech industry by filling this gap. This kind of entrepreneur is most often a top scientist who has also had entrepreneurial management experience. Crocker said ‘I think the situation is improving. The industry is now sufficiently mature that there are a fair number of people who are on their second or third biotech company and have learnt a lot from their past experiences. There is still probably a shortage of really innovative and visionary managers in the UK, but the situation is improving.’
Attracting good staff is always difficult for small firms due to the perceived lack of job security, uncertainty about promotion prospects and the fact that it is often extremely difficult for new employees to fit into the existing team. Furthermore, most small firms lack the pull that many larger, well-established firms have in attracting new staff. With small high-tech firms, the problem is even more acute. First, there is a general shortage of suitably qualified technical staff, and second, the problem is exacerbated by the fact that the many high-tech firms are highly specialized. There are not, for example, many specialists in electronic acoustics, which means that a considerable amount of time and money has to be spent retraining individuals from other technical specialisms. Finally, and perhaps more importantly, good people do not want to join what they are likely to perceive as a ‘sinking ship’.

Attracting high-quality sales and marketing people, although not required in such large numbers as technical people, can be exceptionally difficult. Good sales and marketing staff are always in short supply but again in a high-tech firm the problem is exacerbated, because both the sales and marketing staff require a good technical background and often need a specialist knowledge of a customer’s business. The preponderance of vertical market strategies means that sales and marketing staff must be fully conversant with customers’ industries. Thus, sales and marketing staff in Searchspace\(^{16}\) (a UK provider of financial transaction monitoring and anomaly detection systems) have to be knowledgeable about the banking, finance and securities industries, while at Regent’s Park Healthcare (a London-based provider of re-engineered, specialist cardiac surgery hospitals and healthcare), staff must understand surgeons’ practices.

There is no magic to recruiting. It is hard work and needs to be done at as senior a level in the organization as possible. It is not pure chance that the most successful small firms spend more senior management time on recruiting than their less successful competitors. Recruitment in a crisis tends to take one of two forms: former employees or active ‘poaching’.

**Former employees**

Given the large number of spinoffs in the high-tech industry, it is not surprising that one of the principal sources of talent arises from managers recruiting well-known individuals from their former employers. As we have seen, this may transmit undesirable cultural characteristics, but the use of ‘alumni’ networks has often proven to be the quickest and most reliable approach to recruitment.

**Active ‘poaching’**

Recruiting employees from established competitors, often the industry leaders, is common. Small high-tech firms regard the large players in the industry as good training grounds, given they rarely have the resources to undertake extensive training of their own. Raiding other firms may not always be as easy as it seems, however,
particularly when recruiting senior technical staff. First, many firms grant key technical staff an equity position as an incentive to stay. Second, the establishment of non-competition and non-disclosure clauses in contracts of employment makes it difficult to transfer confidential material from one job to the next. Third, technical staff often work closely on one project or a group of projects related to their own (often narrow) area of expertise. If the technology is extremely advanced, they will want to continue to work in the area.

Retaining technical staff

Interviews with senior management in the UK and the USA indicate that one of the major challenges facing firms is how to attract and retain good technical talent, particularly when a turnaround is implemented. High-tech employees are generally regarded as having high job mobility, partly as a result of labour market conditions (a shortage of suitably qualified technical staff), but partly as a result of the nature of the individuals attracted to high-tech careers. Loyalty is low, particularly with individuals being much more concerned about their personal development than about job security per se. Individuals obtain security by building up intellectual capital (knowledge and competence) for which there is a ready market in other organizations.

This is vividly illustrated by the example of a highly capable software specialist who graduated at the top of his class from Imperial College, London and gained a doctorate at the same institution in record time. During his first year at Imperial he solved a long-standing theoretical problem of artificial intelligence known as the Yale Shooting Problem during the fourth class of a ten-class course. The problem had been thought to be insoluble. This individual declined the opportunity to work at IBM and several other established companies, and instead worked for small high-tech start-ups in the IT sector, several of which failed, forcing him to find a new job. When one of the authors asked him why he worked for small, unstable companies rather than larger, more established ones, he replied that there were so many small IT companies starting up all the time, all of which wanted skilled technologists, that he would rather work for a small company where he could see the whole mechanism of failure and learn from it than work for a larger company where failure would come more slowly and its causes would be less visible to the technical staff. He also felt that the chances of hitting on commercial or professional success were identical in a small or a large high-tech firm, and therefore as the learning opportunity was greater in a small firm he must ‘logically’ work for small firms. Even in the depth of the 2001 recession he found a new job within 14 days of deciding to look for one.

A high turnover of technical personnel has been cited by some writers as one of the unique characteristics of high-tech firms. The average Silicon Valley company has an employee turnover rate of close to 30 per cent.17 A Silicon Valley study of
700 technical specialists and their managers found that the desire for challenging work and higher salaries were the major tangible factors in job-hopping, followed by desirable ‘working conditions’. The key intangibles cited by the same study were ‘the opportunity for advancement, and to grow and develop as professionals and, most importantly, to do challenging work’.

The turnaround manager may want to know why staff have been leaving in the period before their appointment so that they can take steps to eliminate whatever it is that has been causing good staff to leave. In the UK, Garden has explored the same issue with small software companies in the London and Cambridge areas. Table 6.1 shows the employees’ ranking of the potential reasons for leaving their present companies over the next two years, based on a forced ranking of five main reasons cited. The dominant reasons for leaving were found to be similar across both small companies (those with less than 50 employees) and medium-sized companies (those with 50–250 employees). The potential reasons for leaving fell into three main groups with six critical or dominant factors. An increase in salary was by far the most important potential reason given for leaving, but apart from this all critical factors related to the nature of the employee’s job.

<table>
<thead>
<tr>
<th>Ranking</th>
<th>Reasons for leaving</th>
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<tbody>
<tr>
<td>Critical Factors</td>
<td>Increased salary</td>
</tr>
<tr>
<td>1</td>
<td>More experience</td>
</tr>
<tr>
<td>2</td>
<td>More interesting work</td>
</tr>
<tr>
<td>3</td>
<td>Need for change</td>
</tr>
<tr>
<td>4</td>
<td>More challenging job</td>
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<tr>
<td>5</td>
<td>Promotion</td>
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<tr>
<td>Influential factors of secondary importance</td>
<td>Better location</td>
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<tr>
<td>7</td>
<td>Keep up with technical ideas</td>
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<tr>
<td>8</td>
<td>Present company getting too large</td>
</tr>
<tr>
<td>9</td>
<td>Run own company</td>
</tr>
<tr>
<td>10</td>
<td>Reasons other than ones specified*</td>
</tr>
<tr>
<td>11</td>
<td>More control over own work</td>
</tr>
<tr>
<td>Relatively unimportant factors</td>
<td>More structure and clarity and work</td>
</tr>
<tr>
<td>13</td>
<td>More flexible working arrangements</td>
</tr>
<tr>
<td>14</td>
<td>More successful company</td>
</tr>
<tr>
<td>15</td>
<td>Difficulties with immediate boss</td>
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<tr>
<td>16</td>
<td>Friendlier people</td>
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<tr>
<td>17</td>
<td>Opportunity for equity stake</td>
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<tr>
<td>18</td>
<td>Less commercial company</td>
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<tr>
<td>19</td>
<td>More commercial company</td>
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<td>20</td>
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</table>

* Includes personal/family reasons and various idiosyncratic reasons.

The implementation challenge: managing the people

Among the secondary group of reasons for leaving an employer was the desire to keep up to date with technical ideas. This may reflect either a lack of opportunity (in the form of time or training) to keep one’s intellectual capital up to date in small firms or desire by the more ambitious to be at the ‘cutting edge’, knowing that the half-life of much technical knowledge is only 3–7 years, depending on the technology concerned. Either way it has significant implications for management, who need to provide constant opportunities for renewing the knowledge base of their employees.

While potential reasons for leaving provide useful insights into high-tech employees, further insights can be obtained by looking at the time employees expect to stay in their present company, and a range of personal and organizational characteristics. As part of the same study referred to above, Garden did just this, and found that the average length of time employees had been with the companies at the time of the study was two-and-a-half years and they expected to stay a further two years ten months.20 The factors that were found to be important in determining the length of time employees expected to stay were as follows:

- **Education level** – the higher the level, the less time employees expected to stay.
- **The nature of the job** – employees in jobs with a broader range of tasks or activities expected to stay longer. Some job categories showed strong dislikes. For example, systems analysts, engineers and consultants (but not programmers) showed intense dislike of debugging, programming and implementation (in that order), while engineers strongly disliked customer liaison.
- **Perceived competence of senior management** – dissatisfaction with the perceived competence of senior management was found to be a critical factor. The competence of senior management tended to be judged according to employee expectations about the continued success of the company.
- **The nature of the work and organizational conditions** – consistent with the reasons for leaving shown in Table 6.1, the following factors were found to be positively correlated with the length of time employees expected to stay (in descending order of importance):
  - perceived level of challenging work;
  - recognition for doing a good job;
  - opportunity for personal growth;
  - an opportunity for advancement;
  - interesting work;
  - fun and enjoyment;
  - doing something useful;
  - awareness of making a real contribution to the success of the company.
The company atmosphere – the influence of company atmosphere on the length of time employees expect to remain with the company varies with the size of company. In small companies with less than 50 employees, a ‘warm and friendly atmosphere’ is critical to retaining staff, while in slightly larger companies, a ‘flexible and open atmosphere’ is more important. Unlike the situation in large organizations, satisfaction with one’s project team and immediate manager does not appear to be a major cause of concern among employees of the small high-tech firms.

A high turnover rate of technical personnel can have a substantial hidden cost when trying to achieve a turnaround. Not only are there the obvious direct costs of recruitment and training, but there are often considerable indirect cost in terms of management time, lost momentum in new product development and the cost of going down the learning curve with new employees. In fast-moving marketplaces, the additional time that new employees are likely to require to bring new products to market successfully can put a firm at a significant competitive disadvantage and may jeopardize the turnaround itself.

The implications of these findings for management mean they should:

- monitor competitive salary levels constantly;
- design jobs to provide interesting and challenging work;\(^{21}\)
- provide comfortable and attractive working surroundings but without excess;
- assist and encourage employees to keep up to date with technical developments in their area of expertise;
- communicate clearly and constantly with all employees about where the company is going, why, and how it is going to get there;
- provide individual feedback and recognition on a regular basis.\(^{22}\)

Participating in the rewards

Reward systems play a key role in both retaining and motivating staff at all levels. There does not appear to be a general answer to what is the best reward system. It is heavily influenced by the national business culture of the country, by the corporate culture and by the strategic needs of the business. As with non-high-tech firms, reward systems vary by level of employee and by function. Many firms have high basic salaries for technical staff and relatively low basic salaries plus commission for sales staff. The commission structure for the sales staff in many of the IT companies can provide enormous financial rewards for the top salespeople, often far in excess of the total remuneration paid to the chief executive.

The main distinguishing feature of young high-tech firms is the relative importance attached to equity ownership for the key executives. Interviews with a
The implementation challenge: managing the people

A wide cross section of senior managers in small high-tech firms indicated that they were more motivated by equity than younger employees. They tended to have a longer-term view and their need for immediate cash benefit was lower. In fact, the better performing UK firms tended to be characterized by high equity participation from the founder and other key executives. In the USA, founders of post-IPO Internet companies retain about 22 per cent of the company compared with 18 per cent in the UK. In the USA, equity participation is more widespread and commonly includes key technical people in addition to management. The attractiveness of equity, however, is dependent on the likelihood of a public quotation or the prospect of a sale to a third party. The need to share equity among senior managers was observed to be higher in people-intensive service firms than in production-oriented firms. Once a crisis has hit equity participation, it is all the more important to attract and retain key staff.

COMPANY CULTURE

Very little has been written about the distinctive cultural patterns of high-tech firms, and yet the media has built up a ‘picture’ in the minds of the public that the firms in Silicon Valley in California, along Route 128 and around Boston, and in science parks in Europe are in some way distinctive. It is true that many of the most successful high-tech firms that receive much publicity, such as Intel, Apple Computer, Microsoft, Nokia, etc., do have strong, distinctive cultures, but small firms vary enormously. Some are hardly distinguishable from non-high-tech firms, particularly those that are not at the leading edge of technology or are primarily subcontract manufacturers, distributors or service operators for high-tech industries. Others have extremely distinctive cultures. One young software writer who had previously worked for a large technology-based company commented:

*The transition from a large, sprawling organization to the far smaller world of PCL was immediately obvious. At PCL nobody is more important than anybody else. It is recognized that we each have our own key function and contribution to make to the success of the company. This team spirit was never apparent in the larger company.*

Company culture is, as we know, determined by such factors as a firm’s history, ownership, size, technology, environment, type of employee and management objectives. The personality of the founders, particularly that of the dominant founder, is crucial in all small firms. What is somewhat different about high-tech firms, besides the technology itself, is the nature of the employees and the environment in which the firm operates. The employees are often quite different in type, mobility and motivation to those found in other organizations. Furthermore, the fact that many...
High-tech firms are located in proximity to one another (e.g. in Silicon Valley in California, along the London and M3/M4 corridor in the UK) means that much more extensive networking and interchange of ideas takes place among employees than is normal for small firms, which often operate in virtual isolation from the rest of the business community. The rapid change in technology means that employees are obliged to keep up to date with what is happening and be creative in both the markets and technological disciplines.

From personal observation, however, it seems that it is the experience of both managers and employees in the formative years of their career – usually in their mid 20s – that has a big impact on how they will act at later stages in their lives. New high-tech ventures established as spinoffs from other companies nearly always include common values from the parent company culture. For example, one UK systems company set up by a group of seven IBM managers actively embraced training from the day it started. Forty Friday afternoons each year, the chairman personally conducts training sessions on different topics ranging from effective communications to understanding the marketplace.

In another UK high-tech company, not a start-up but a listed ‘shell’ company formed in 1999 to acquire high-growth high-technology start-ups, the COO ‘talked the talk but had no idea how to walk the walk’ in the words of an analyst who knew him. The COO continued the worst habits from his old culture which had been in a large UK corporate with a history of destroying shareholder value. The most technically able staff were given less powerful computers than the most senior managerial staff, senior management positions were doled out on the basis of time served and several managers made redundant from the COO’s old corporation were given management jobs overseeing technical staff. Within six months the company had acquired three operating subsidiaries and agreed a further three acquisitions. Although the investors and COO insisted that the company would follow modern management practice, the reality was different. The COO remained aloof from staff, e-mail and voicemail between staff was regularly intercepted and read by the clique from the old corporation, and a share options scheme was promised but never granted. Paper-based communications and manual accounting systems were introduced to replace the e-mail management communications and information systems that had been used by the acquired companies. Productivity declined and corporate actions became more bureaucratic and expensive. The COO was fired within a year and replaced by an investor. The investor lasted a few months. In the search for a replacement, several managers with good track records and backgrounds declined the post. The third COO had had a chequered career and came with the backing of equally chequered private investors. His analysis showed that the only people adding value to the company were some of the most junior employees and two middle managers, but
unfortunately all the managers who represented nothing but cost had such long notice period that the company could not afford to get rid of them. Instead this company got rid of the most promising managers and staff, retained the dross, and went to the edge of insolvency, where at the time of writing (2002) it remains.

A frequent lack of commercial experience is the major disadvantage of having an academic–inventor in a leading role within a university spinout company. A lack of commercial experience can, however, be just as bad as poor employment experience. In what was actually a successful start-up of a local network company in Cambridge, England, none of the four founders had commercial experience. They had all previously been either students or academics and all were perfectionists who openly criticized each other. While the company was small, this was not a problem, but it caused great difficulties as the company grew.

It is difficult to generalize about the culture of high-tech firms, given the great diversity of entrepreneurial personalities and firms that make up the high-tech sector. However, the cultures of young high-tech firms, like their product-market positions, are very fragile. Almost by definition, high-tech firms have not had the time to embed their culture into the organization that some of the long-established high-tech firms such as Nokia, Novell and IBM have. The fragility is more a function of time than size, since although Netscape reached $4.8 billion in sales when it was purchased in 1998, its culture was still extremely fragile.

There is plenty of evidence that successful high-tech companies tend to have a strong corporate culture, although strong cultures may also have shortcomings. With high-tech firms, the culture should be geared to innovation and customer responsiveness, both of which are key to strategic and operating success. Founders and senior management of high-tech firms understand that building corporate culture takes time and effort – and the process must begin at start-up or even earlier. The process by which the initial business plan is put together, choices about where to locate and which employees to hire immediately after start-up can all have significant impact on the culture that develops. Most important of all the factors that determine culture in a young high-tech company is the personality and vision of the founder. If there is a founding team, it is either the vision and personality of the dominant partner or that of the combined team that influences the corporate culture.

The strong influence of product development in many high-tech firms means that many end up with a product or technology-led culture. In the early days of product-market development this culture can often ensure the development of robust products that give the firm competitive advantage. However, if competitive conditions change, new entrants emerge and the firm has to lower its cost base, and a more marketing-led and cost-conscious culture is required. Experienced managers know that changing a firm’s culture is extremely difficult, and the ideal
situation is where an appropriate culture is developed at start-up and maintained as the firm develops. The details of corporate culture can never remain constant as a firm’s strategy and people have to adapt constantly to the ever-changing external environment. However, many successful high-growth, high-tech firms establish a culture that permits constant change to occur. These are organizations that value change, not for the sake of change but because they allow the firm to be one step ahead of the competition. They are organizations that started out on day one with the founders insisting on operating in a flexible way.

Lotus Development Corporation was a company that used the word flexibility often, even including it in its statement of corporate values. Jim Manzi, former president of Lotus, talked about how flexibility was built into hiring decisions and then constantly reinforced: ‘We look for people with flexibility because of the rate of change and so the stress level is fairly severe. Building flexibility into the system and into the expectations of both old-time people and new people is real important.’ Interestingly, Lotus would not recruit a person with the best technical background if their personality did not look like a good fit with the corporate culture.

Implementing a culture that embraces constant change needs the founder or one of the founding team to promote the values that keep a firm successful. How do you ensure that your vision of a positive company culture is made real in the day-to-day interactions of the business? One view is that it becomes easier if you treat culture as communication. Start by creating the culture that you want around you and your immediate work group, and then propagate it out to others. In contrast, imposing culture change ‘by edict and memo’ tends to fail. Let your actions speak about your culture as much as your words, and change the pay and compensation system to reinforce the desired culture. In the IT department of a large European investment bank, the CIO instituted a major programme of cultural change beginning in 2001. As part of this a series of informal parties was held (paid for entirely from the CIO’s personal funds) a major aim of which initially was to get everyone in the IT department to talk to each other face to face rather than via e-mail, not just at the party but throughout the invitation process – the invitation was made by word of mouth, from person to person. (This CIO was already a successful serial entrepreneur and is running a very successful IT department, and the significance of the effort that he has put into changing culture should be noted.)

Cisco Systems also demonstrates a belief in the vital importance of the personal aspect of communication in corporate culture. ‘Any time we can get information to people that is personal, remove an intermediary, and give employees the decision-support tools to analyze and improve their situation, that’s empowering. Our goal was to create an environment where employees have the right information at the right time, and the ability to act on it.’
Personal communication and openness are part of a wider notion of integrity which has been identified by Maidique and Hayes as one of the characteristics of successful high-tech firms. Integrity involves not just openness but also honesty and fairness and trust. Such values are seen to be particularly important for firms operating in a highly volatile environment where risks are difficult to assess. Maidique and Hayes concluded that ‘without integrity the risks multiply and the probability of failure (in an already difficult enterprise) rises unacceptably’.

**MANAGING THE FUNCTIONAL BOUNDARIES**

The key to good strategy implementation is always the way in which the major functional areas work together to meet customers’ needs. Specifically, the interfaces between marketing, operations and engineering or R&D are important, although other critical interfaces may exist as organizations grow and specialisms develop within the functional areas. Firms that rely on strategies of differentiation to compete in the marketplace, like most high-tech firms, require strong co-ordination between the functions to ensure they provide unique products and high service levels. The need is even more acute in high-tech firms, since very close co-ordination and co-operation are required between functions if they are going to be quick enough to respond to rapidly changing technology and market conditions and provide the necessary level of customer service. Technology underlies all three major functional areas of the business, and so successful integration requires general management – who have responsibility for the integration – to have a good understanding of the underlying technology. This does not mean that the general manager needs to be a technologist or even have a technical background, although this obviously helps, but that he or she can ask the ‘right’ questions and has both the ability and willingness to become technologically literate.

The major boundary issues which require co-ordination and co-operation between functional areas in high-tech firms, both small and large, are summarized in Figure 6.1. It is beyond the scope of this book to go into each of the individual issues; see Riggs (1983) for a more in-depth treatment of the issues. Although field service management is shown in Figure 6.1 as an issue in the marketing/marketing interface – which indeed it is – many high-tech firms, particularly in the computer industry, separate out service as a distinct function equal in status to marketing. This will become particularly important in the 2000s for both computer hardware and software companies, as the software in which computer hardware companies are currently trying to differentiate themselves becomes a commodity with the growth of non-proprietary software, notably Linux and to some extent XML.
One of the characteristics of high-tech firms in trouble is a plethora of operating problems relating to the critical boundary issues shown in Figure 6.1. Managing the functional boundaries requires good horizontal working relationships within the firm and breaking down of the individual functional cultures which inevitably develop. A strong corporate culture provides a clue for ensuring that the various functional departments work together in the interest of the whole firm. A strong leadership style along the lines discussed below is usually required to make sure all the necessary horizontal relationships work effectively.
LEADERSHIP STYLE

There is no one right way of managing high-tech firms. There is an enormous range of leadership styles and many different ways of achieving the same results. However, the most successful firms (as judged by both sales and profit growth) appeared to have a strong democratic leadership style. Strong leadership with a clear vision and clear objectives is needed to manage the type of people attracted to working in high-tech firms, but strong leadership does not work with high-tech employees if it is too autocratic. Well-educated staff find a highly autocratic style difficult to get along with and will leave, particularly in more people-intensive businesses. Ideally what is required is a democratic or shared leadership style, with the chief executive allowing plenty of opportunity for debate, but also recognizing that in a crisis time is of the essence and some necessary decisions will be unpopular.

A style which relies solely on building consensus before a decision is made is too democratic in a crisis. It would lead to slow decision making and be seen as weakness by subordinates. The chief executive must always be seen to be in charge, otherwise frustration and anxiety will build up among the functional executives and spread quickly throughout the organization. Functional vice presidents and directors rarely want to make decisions outside their areas of expertise, although they want to be consulted and involved. If the chief executive has to err on one side or the other of the autocratic/democratic boundary, it is better for him or her to be more rather than less autocratic.

The process by which decisions are arrived at is an important issue for chief executives and they should give considerable thought to when and how they involve the management team. Excellent advice on this subject is given by a surprisingly (by today’s standards) low-tech individual, the former Lord Chancellor of England, Sir Francis Bacon, in his *Essays*, particularly those on ‘Counsel’ and ‘Dispatch’. One of the authors has noted that a highly successful UK technology entrepreneur runs his businesses almost according to Bacon’s advice, with great practical benefit, although it is not known whether this entrepreneur has ever read Bacon.

The requirement for fast, analytical and bold decision making (discussed in Chapter 1) to deal with the extreme uncertainties in the high-tech environment means that one individual is unlikely to have a full range of capabilities necessary for high-quality decision making. It is therefore more important in turning around high-tech firms for the chief executive to be supported by a team of functional executives with well-balanced skills. The usual requirement is to balance the technical capabilities with sound commercial sense.

Managers in better performing high-tech firms work as a team rather than as individuals, although this does not imply the absence of friction among team members. The importance of working together as a team is stressed by many chief executives, including Compaq’s Rod Canion, who uses a collective approach to
decision making, recognizing that no one person on the management team has all the answers. Canion says:

We have a team process that leads to getting the best answer. We’ve encouraged all the things that it takes to have a team spirit. All companies want it, most of them talk about it, but few companies really have it, at least to the degree to which Compaq has been fortunate to develop and maintain it.36

Frequent interaction with managers and employees alike gives chief executives the real-time information they need to make fast decisions. Chief executives in the more successful firms prefer face-to-face communication and telephone calls to memos and reports, and have more regular scheduled meetings with their supporters. In times of crisis or when important decisions have to be made, the practice of working together as a team using real-time information may help to smooth the decision-making process.

While the chief executive must be decisive and take the lead in making strategic decisions, he or she should be careful not to make all decisions. There is some evidence that the more power that is delegated to functional executives to make functional strategic decisions, the better the performance of the firm.37 This is not to say that the chief executive will not be involved in the decision, only that he or she may be second in their influence to the relevant functional head of department. Low-performing firms are often characterized by an emasculated top management team, while in contrast in top-performing firms the team feels empowered. The successful high-tech firm requires both a powerful, decisive chief executive and a powerful top management team.

Where decision-making power has been kept from senior executives by the former chief executive, behind-the-scenes politics may have emerged and interfered with effective management.38 When this occurs, conflict between key executives arising from disagreement relating to organizational goals, key strategic decisions and interpersonal difference is likely to have led to secretiveness, the formation of coalitions and other unhealthy political behaviour. Some conflict within a top management team is healthy and is probably inevitable in a high-tech firm where the top management are more likely to be well educated. However, if conflict and negative political behaviour exist, the new chief executive needs to use the right processes to encourage constructive debate and outlaw behind-the-scenes politicking in a public way.

Politics are time-consuming, restrict information flows and create communication barriers within a team. These negative effects are likely to be particularly harmful in fast-moving, high-tech sectors and must be stopped immediately if there is to be every chance of a successful turnaround.
Being chief executive of a high-tech firm is an extremely challenging job. It requires a unique blend of leadership and management skills to overcome the forces driving fragility. Few chief executives have all the attributes necessary to ensure success. It is therefore imperative that the chief executive is conscious of his or her weaknesses and bolsters the top team accordingly.

**SUMMARY**

This chapter has highlighted some specific organizational and people issues which are of special concern when implementing a turnaround in a high-tech firm. The motivation profile of a typical employee is often quite different from that found in conventional firms, with the result that the way employees are rewarded and managed needs to be different too. Since it is the high proportion of technical staff among employees that makes the organizational characteristics distinctive, the recruitment, training and retention of such staff are a high priority if longer-term sustained recovery is to be achieved. The human resource practices adopted by the turnaround manager in high-tech firms must take account of both the nature of the workforce and the size of the company.39

Many of the most successful firms develop cultures which are informal and egalitarian but are, nonetheless, strong. These cultures, which have often been carefully nurtured by the old management, can be highly resistant to change. While there is no single management style appropriate to turning around high-tech firms, the more successful appear to have strong, democratic leadership and quickly build a well-balanced management team with a team spirit.

**Notes**


11 Garden, A., ibid.
12 Garden, A., ibid.
13 Crocker, Glenn, Ernst & Young LLP. Unpublished correspondence to S.M. Nokes.
14 Powlett Smith, William and Crocker, Glenn (2001) ‘United Kingdom: strong biotech market promotes regulatory changes while seeking new funding opportunities’, Ernst & Young, United Kingdom.
15 Crocker, Glenn, Ernst & Young LLP. Unpublished correspondence to S.M. Nokes.
19 Garden, A. (1990) ‘Turnover reasons of software employees in a range of small high-tech companies’, IEEE Transactions on Engineering Management. Both authors have recent direct experience of high-technology turnarounds, in London and Cambridge, and Garden’s findings hold today as much as they did when he wrote the paper.
21 There are many articles and books about job design, although none specifically related to small high-tech firms. As a start, see Kleingartner, R.A. and Mason, R.H. (1986) ‘Management of creative professionals in high technology firms’, Industrial Relations Research Proceedings, April, pp. 508–15.
31 From the Cisco corporate website, November 2001 (www.cisco.com).
38 Politics is defined as the actions (often covert) by which executives enhance their power to influence the decision.