The Role of Information Technology in Transforming the Business

BUTLER COX FOUNDATION

Research Report 79, January 1991

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Report synopsis

There is a growing school of thought that traditional functional management is no longer appropriate in an era when quality, innovation, and service are of paramount importance. Process management is a way of transforming the business, which frees it from the restrictions of the traditional approach by cutting across functional divisions. Information systems promise to turn the dream of such organisational restructuring into a reality. They are the fundamental ingredient of redesigned business processes and are therefore essential to any large-scale transition to process working. While this transition will rarely be led by the systems director, the implications for his department are far-reaching. Systems staff at all levels will be involved throughout the transition programme, and they will inevitably be required to play roles and to adopt working approaches that have not been asked of them in the past.

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Research Report 79, January 1991

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Report conclusion

A management summary of this report has been published separately and distributed to all members of the Butler Cox Foundation. Additional copies of the management summary are available from Butler Cox.

Chapter 1

Transformation means managing business processes

Today, a growing band of organisations is managing important parts of the business in a new and different way. It is called process management, and it differs sharply from the traditional functional approach that has been used by all but the smallest organisations for more than half a century. Its advocates claim that, by cutting across departmental demarcations, process management gives businesses the ability dramatically to improve response times, service, and quality. Precisely because it traverses formal organisational boundaries, however, process management brings with it some major new management challenges. It implies team working, with individual team members, empowered with greater discretion, undertaking a wider role than before. Once an organisation perceives its business in terms of processes, it can usually see ways in which they may be redesigned to yield further improvements. Information systems have an important role to play. They are the essential ingredient by which the idea of process management can be turned into a practical proposition. Moreover, business processes can be redesigned to take advantage of the latest developments in information technology. None of this comes easily, however. The challenges for business and systems management alike are great indeed.

In our research, we set out to identify what a transformed organisation would look like, how the process of transforming could be achieved, and what role information technology could play in the process. To start with, we were confused by the terminology we encountered. *Transformate*, for example, is a combination of transform and informate, the latter being a word coined by Shoshana Zuboff, the American researcher, to describe how information technology can be used to automate operations, and at the same time, to create information. *Business re-engineering, business recasting, organisational restructuring*, and *the learning organisation* also occurred with varying degrees of frequency in the literature we studied.

There is, however, a common thread running through the concepts underlying these terms. It is *the redesign of business processes*. In this report, transformation therefore has a specific meaning. A company is transformed when it succeeds in completing the change from an earlier functional organisation to one entirely based on processes, right across the business.

Traditional functional management is becoming less appropriate

Most large businesses break work down into a sequence of separate, narrowly defined tasks. The people performing the tasks are correspondingly segregated by function, such as sales or accounting, each function administered by a manager. The management structure forms a hierarchy, often with many layers separating the top of the hierarchy from the bottom.

Functional divisions and hierarchical structures of this sort form the basis of the way in which most work is done. These arrangements have been well adapted through much of this century to support the classic business goals of cost efficiency, growth, and control. Indeed, they are so well ingrained into society and culture that it is sometimes hard to conceive of work being done in any other way.

A growing school of thought, however, holds that traditional functional management is no longer adequate for a post-industrial age in which quality, innovation, and service are assuming more and more importance (see Figure 1.1). Instead, businesses should perceive their activities as a set of processes that cut across the conventional, functional organisation. An example of a business process is receiving a request from a customer, fulfilling the request, billing the customer, and accepting payment. Such a process would normally involve several functions, including sales, order processing, and accounting.



First Wachovia, a US retail bank, has introduced process working in a critical part of its business. It has swept away the conventional departmental organisation and concentrated instead on the process of customer sales and service. Each customer is assigned a bank officer, called a personal banker, who handles virtually all his transactions. Typically, a personal banker will approve loans, check if repayments are late (and decide what should be done if they are), and sell new bank services. Two ingredients of this process approach to working are the empowerment of individuals to take on a wider range of responsibilities than before, and the use of information technology to support and guide the individuals' work routines and decision-making. The benefits to First Wachovia have been considerable — lower costs, fewer delays, and better service.

To some businesses, a move to process working promises a quantum leap in business performance. This is particularly so in large companies, where size and responsiveness often seem contradictory. So it is no surprise that the subject is receiving growing attention in the business press, and from consultants and management gurus.

Peter Drucker, the consultant and author on management affairs, for example, envisages the advent of information-based organisations composed of high-performance teams coordinated by a simplified Businesses should perceive their activities as processes that cut across the organisation

Process working can lead to a quantum leap in performance

management hierarchy. In the *Harvard Business Review* (January-February 1988), he states that, "the typical large business 20 years hence will have fewer than half the levels of management of its counterpart today, and no more than a third of the managers. In its structure, and in its management problems and concerns, it will bear little resemblance to the typical manufacturing company of around 1950 that text books still consider to be the norm. Instead, it is far more likely to resemble organisations to which neither the practising manager nor the management scholar pays much attention today: the hospital, the university, and the symphony orchestra."

Peter Drucker is not alone. Other influential management thinkers believe that the business policies and procedures built up painstakingly in recent decades are going to have to be replaced by new, redesigned processes. Such drastic change is being forced by unprecedented competitive pressures. For the first time, businesses have available the means of effecting the change, in the form of information systems.

Information systems promise to turn the dream of organisational restructuring into reality. It is this simple idea that is the common theme whenever the subject of business transformation is discussed. By adopting some fundamental changes — process working, empowered staff, and information systems designed to support them — businesses can transform their flexibility and responsiveness. It is a seductive message. Unfortunately, the path to salvation was never as simple as that.

Process working means a dramatic break with the past

To many managers, thinking about cross-functional business processes does not come easily. Managers are not accustomed to looking beyond the functional activities of their business to the processes that lie behind them. If they think about them at all, most managers regard these processes as fundamental to the way that business works, and therefore as unquestionable and unchangeable by nature. Processes are inherited, not designed. It is hardly surprising that the idea of redesigning business processes is a concept that is entirely novel to most managers.

That is why few large businesses have yet adopted business-process management on any significant scale. There are other reasons, too. Although the benefits have been emphasised, the costs in terms of disruption, retraining, and system reworking are extensive. Little has been published in the public domain about these obstacles. The ingredients needed to ensure success, in terms of management style, business size and sector, and product and market type, remain unclear.

By empowering cross-functional teams, process working undermines the conventional organisational structure, threatening managers' status and progression. It is not immediately obvious how the responsibilities of the team workers should be defined, nor how they should be selected and trained.

The role of the systems department is similarly uncertain. Copious and timely information is clearly necessary to support process-

Information systems are the key to organisational restructuring

Managers never question functional processes

Few businesses have yet adopted business-process management oriented team working. That implies a strong need for information technology, and in turn, a role for the systems department in providing the necessary systems support. What is not clear, however, is whether existing functional systems are adequate as a foundation, or whether they should be scrapped and replaced. There is a related but perhaps more fundamental question. Are systems merely the means by which business-process management can be made to work effectively, or is the redesign of business processes the key to unlocking the real potential of information technology?

Both general and systems managers are fundamentally affected

It is in the light of complications such as these that this report has been researched and written. The work has been undertaken with a dual readership in mind. On the one hand, the report is designed to help senior executives and general managers to understand what process management is all about and so to decide whether it is something on which they should embark. On the other hand, the report is also aimed at systems executives who need to understand the role of systems in facilitating and supporting the management and redesign of business processes, and the implications for applications development and integration.

The report will be of primary value to readers from large businesses with a formal functional organisation in place. These are the businesses that will face the trauma of transforming themselves through the management and redesign of business processes in the future; small start-up companies can adopt the style from the outset.

The need for the study was identified by Foundation members when they responded to our annual survey of future research topics. The significance of the subject was underlined when around 100 members responded to a questionnaire identifying the scope of the research work and exploring the issues of specific interest that the research was to address (see Figure 1.2). Very few members claimed to have direct experience of the subject. Many, however, indicated an active and already growing interest within their organisations. Others, while admitting that the time was not right for their organisations at present, expressed a desire to learn as much as possible in preparation for the future.

The report is structured in four main chapters. Chapter 2 provides details of practical experience; we examine a sample of case histories of companies that have implemented business-process management successfully, and analyse the benefits that have accrued.

In Chapter 3, we explore the implications of redesigning business processes and the role of information technology, seeing how information technology can add value to the business.

In Chapter 4, we outline a programme for business managers who need to know in more detail what is involved in managing business processes.

Chapter 5 is principally for systems executives. It explains the role of the systems department in the realisation of process working, the function of the systems director as a facilitator rather than a

Large, functionally organised businesses will face the greatest trauma

Chapter 1 Transformation means managing business processes

Figure 1.2 Scope of the research and research team

Five principal questions were identified by the Foundation members who responded to our questionnaire:

- What is meant by process management, process redesign, and business transformation?
- Why should a business be interested in these things? What are the benefits and do they amount to sustainable competitive advantage?
- Which companies are implementing business-process management: what are the criteria for success in terms of management style, business sector, and size?
- How does a business introduce process management: is there a method, where does it begin, and should it be introduced wholesale or piecemeal?
- What is the role of the systems department: is information technology crucial or merely useful, does the systems department have a special role to play, and what are the main issues to look out for?

The report was written by Roger Woolfe, Butler Cox's director of research, and reviewed by Tony Brewer, who directs Butler Cox's International Foundation Programme. The research was led by Martin Ray from Butler Cox's London office, with assistance from Rob Moreton (London), Lothar Schmidt (Germany), Onno Schroder (Netherlands), and Thomas Schael (Italy).

The team examined the literature on the subject, then carried out a programme of face-to-face interviews in Europe and the United States. They met executives in the businesses that have pioneered change in this field, and acknowledged authorities and opinion leaders on both sides of the Atlantic.

driver, his responsibility for influencing business managers, and the importance of including systems staff in multidisciplinary teams. We describe why speed and flexibility are crucially important in building new systems, provide guidance on what to do with existing systems, and stress the need for company-wide technical standards to facilitate the task of systems integration.

Chapter 2

The benefits of process management are wide-ranging

A business process is a set of work activities that cuts across functional boundaries in order to realise a business objective, such as fulfilling a customer order. A set of processes describes the way a business carries out its work. No sizeable business that we are aware of has succeeded in transforming itself entirely from functional to process working. Some have converted one or more significant parts of their operations to process working, however, and it is worth examining their experience.

We begin with four selected cases, representing a variety of backgrounds. These are followed by brief descriptions of 10 further cases, grouped by industry sector. They illustrate a wide diversity of applications in middle-sized or large companies, most of which are fairly centralised, and the range of benefits that can be gained from adopting a process approach to managing the business.

Four case histories illustrate early experience of the concept in action

Four widely differing companies that have embarked on process management are the Ford Motor Company, IBM, Mutual Benefit Life, and Dow Europe. In each case, the prime objective has been to counter growing competitive pressure. Business processes concerned with improving customer service are most in evidence. While some are centred on relationships with suppliers, such processes are a less common starting point for companies adopting this approach.

Ford has redesigned its accounts-payable procedure

Ford buys in about two-thirds of its car parts from outside suppliers. It changed its parts-receiving and parts-payment procedure, and this provides a good example of the efficiency improvements that can be obtained as a result of process redesign.

Previously, Ford employed about 500 people to order components, receive the parts, and pay suppliers. Management thought that, by rationalising procedures and installing new computer systems, it could reduce the headcount to 400. Mazda, a Japanese car maker, already did the same job with fewer than 100 people. Even after allowing for scale differences between the two firms, the gap was enormous. Mazda's secret was that it did not wait for invoices from its suppliers. In contrast, when Ford's purchasing department wrote a purchase order, it first sent a copy to accounts payable (see the upper half of Figure 2.1). When the goods were received, goods inwards sent a copy of the receiving document to accounts payable. Meanwhile, the supplier sent an invoice to accounts payable. It was No sizeable business has transformed itself entirely

The prime objective is usually to counter competitive pressure

Ford made significant efficiency improvements



accounts payable's job to match the purchase order against the receiving document and the invoice, before issuing payment. In practice, the department spent most of its time investigating mismatches.

Ford's original idea was to use computers to streamline the investigation procedure. Mazda's experience, however, pointed to the need for a complete redesign of the process. Ford went ahead, implementing 'invoiceless payment'. Now, when the purchasing department places an order, it enters the information into an online database (see the lower half of Figure 2.1). When parts arrive at the goods-inwards receiving dock, a warehouseman passes a barcode reader over the label, entering details of the parts into the inventory system and sending electronic payment to the supplier.

Previously, Ford paid when it received an invoice. Now, it pays when it receives the goods — but the clerical and data processing complexity is eliminated. In effect, the goods-inwards staff are empowered to check the incoming parts and authorise payment.

Ford implemented an 'invoiceless payment' process The redesigned process of receipt and payment bypasses accounts payable. As a result, Ford has achieved a 75 per cent reduction in headcount, not just the 20 per cent that it would have gained had the original plan gone ahead.

IBM has four new market-driven processes

Recognising that life for computer suppliers is changing as fast as it is for anyone else, IBM intends to get closer to its customers in order to improve both its responsiveness and its level of service. IBM knows that it is becoming increasingly difficult to maintain a competitive edge merely on the basis of computing and software technology. The competition from fleet-footed, innovative companies is intensifying, and entry barriers are falling.

IBM's idea is to capitalise on its customer and market data. It believes that it can excel at understanding its customers' requirements and interests, and their satisfaction with its solutions, because of the size and scope of its market data. IBM will achieve this by complementing its existing functionally organised procedures with new cross-functional business processes.

To begin with, there will be four new processes. IBM refers to them as select markets, develop solutions, deliver and support solutions, and measure performance (see Figure 2.2). Each will cut across IBM's traditional functions of development, manufacturing, sales, and aftersales service. Each of the four new processes will be staffed by a 'solution team' and the teams will complement, rather than replace, the old functional divisions, creating a matrix organisation. One immediate consequence is the demise of IBM's traditional nationally organised sales force. Now, IBM is organising its sales force by customer, or for smaller customers, by industry sector. Multinational customers, for instance, have the option of 'one-stop shopping'.

Figure 2.2 IBM's four market-orie requirements	ented processes have different information
Process	Information requirements
Select markets	Nature of business opportunities Market segmentation Details of competition Distribution-channel capabilities
Develop solutions	Customer wants and needs Possible business partners Cost, time, and quality details Dependencies: the elements of the developed projects
Deliver and support solutions	Customer intentions and attitudes Assignment of skills and resources by market segment Market coverage Solution library
Measure performance	Customer satisfaction Financial returns Market share

IBM wanted to capitalise on its customer and market data . . .

... so it developed four new business processes

Not surprisingly, IBM sees information systems as crucial to the success of process working. Each team will be able to access information maintained separately by the functions, but integrated through new systems. The plan has major implications, not only for IBM's functional managers and the process teams, but for the systems department as well. Larry Ford, head of IBM's internal information services, with a staff of 27,000, has described three principles governing the company's approach to process working and the supporting information systems. First, single 'owners' in each country will be assigned responsibility for managing customer and marketplace information. Second, information will be aligned on a worldwide basis. Third, decision-makers across the enterprise will have access to shared information. To turn intention into reality, IBM has modified its business-supporting systems strategy and formed an Enterprise Information Council, providing the company's first worldwide internal line-management focus on information.

Mutual Benefit Life has redesigned the way it processes insurance applications

Mutual Benefit Life (MBL) is a long-established US insurance company. To improve its competitive position, MBL has introduced some sweeping changes in the way it handles applications for insurance policies. It has replaced a sequential operation spanning five functional departments by a process that puts full responsibility into the hands of a few individuals, called case managers. Prior to the change, an application would have to pass through as many as 30 discrete steps, each a fixed and repetitive clerical task undertaken under the watchful eye of a supervisor. The procedure worked well for the majority of applications, but was ill-suited to rapid-turnaround applications and exception handling. (For instance, MBL balanced its internal books by writing interdepartmental cheques to itself when a customer closed down one kind of policy in favour of another.)

The case managers have been given the authority, skills, and access to the information necessary to control the entire underwriting process, from the time an application is received to the time a policy is issued. As a result, MBL can handle more than twice the volume of new applications that it could before, and has eliminated 100 field-office positions. The average turnaround is now only a few days, instead of two to three weeks.

Case managers get strong systems support from powerful PCbased workstations that are connected to a range of automated systems on a mainframe. The company is developing a range of new systems (see Figure 2.3, overleaf). Through the use of an expert system, for instance, MBL has cut turnaround time for some applications to just four hours. Some of the expert systems use multimedia (computer-based simultaneous text, audio, and pictures) to make it easier for the case managers to interact with the systems.

A change as extensive as this demanded strong vision from the top, and a radical overhaul of the company's culture. The steps taken by MBL were described by its chief executive, Henry Kates, at the Society of Information Management's 1990 conference. Case workers' activities tend to highlight the barriers that have grown up over time between the different functions. The company has consciously tried to reduce these barriers, by arranging for employees to get

MBL's functional operation was unsuitable for rapid-turnaround and exceptions

The new process-oriented approach enables MBL to handle twice the volume of new work

Figure 2.3 Mutual Benefit Life is implementing new systems to support case workers

PC workstations networked to shared databases.

Expert systems to help draw inferences from customer and company databases. Interactive self-paced training courses.

Database pattern analysis — for instance, to identify regional and local trends in health care such as changes in billing practices.

Voice messaging through the PABX to improve the efficiency of internal administration.

High-speed digital telephone lines to link telephones to corporate databases by automatic number identification.

Multimedia — to display, say, a scanned image of the customer alongside text and data records on the desktop.

to know one another informally and socially. So, it has arranged games, lunchtime concerts, and departmental social events to celebrate accomplishments.

Dow Europe is implementing an extensive programme of change

Dow Europe, the multinational chemical company, has embarked on an extensive programme of organisational change. Its longterm aim is to convert from functional to process management right across the business — by our definition, to transform the business.

Two main goals lie behind Dow's decision to restructure: a desire to apply more widely the lessons learned earlier from its qualityimprovement programme, and a concern to improve operating efficiency and customer responsiveness, at a time when many of its products are in danger of becoming commodities. Dow believes that process working provides two further benefits. It should enable the company to get more from information technology than would be possible merely by automating the work flow through the existing functions, and it will provide the means by which the business can take advantage of the single European market, by changing Dow from a national to a transnational operation.

By the summer of 1990, Dow had identified 10 major processes that would together form the basis of its future operations. It had also worked out how information technology would support the processes, and which ones to tackle first. The 10 processes and their interrelationships are shown in Figure 2.4. At the centre is 'satisfy customer', the process identified by Dow as critical, and the one to tackle first.

To identify and assign priorities to these processes, Dow adopted a five-step procedure (it was described by Scott Brown, European systems director, at the UK Foundation conference in 1990). In essence, senior business managers from around the world identified the critical success factors for their functions, then met to discuss, identify, and set priorities for the new business processes. Next, Dow matched the critical success factors with the business processes to check for consistency and to assure itself that process management would improve operating efficiency. Finally, and with assistance Dow Europe aims to convert its entire operations to process management

Ten major processes form the basis of Dow's operations



from systems staff, the managers agreed on the level of systems support needed by each process.

This final step gave systems managers the high-level direction they needed to begin planning the supporting systems in detail. They soon discovered that, whereas some existing systems could be modified, many would have to be entirely new. That meant wholesale changes, which led, in turn, to the adoption of four principles by the systems department — buying package solutions wherever possible, concentrating operations on one or two large data centres, centralising systems development in a few selected regions across Europe, and providing a common Europe-wide infrastructure to enable applications to be integrated. These four principles now form the basis of Dow's revised systems strategy.

The concept is applicable in a broad range of businesses

Business-process management is not peculiar to any one industry sector; nor is process management peculiar to businesses that are only of medium size; some of our cases are very large companies. We describe below the experiences of 10 companies that further illustrate the benefits of business-process management, under three broad sector headings — manufacturing, banking and finance, and transport, distribution, and trading.

Manufacturing

Siemens has redesigned its engineering parts-purchasing process. Previously the responsibility of purchasing specialists, it is now carried out by engineers. The engineers identify potential sources of supply for the components they need, then select suppliers on the basis of price and delivery date. The engineers are supported by an information system that they are encouraged to update. According to Siemens, the redesign has reduced by one-third the effort required to place a component order, and has reduced the elapsed time by two-thirds.

Buick, the US car maker, has redesigned its customer purchasing process. Customers' orders for new cars are placed electronically by dealers, and are linked directly into the production-scheduling system. Customers know within a maximum of 24 hours when their new car will be delivered, and the entire production schedule, from order placement to delivery, has been reduced to 10 days or fewer. Buick is now installing terminals in its dealers' showrooms to enable customers to specify their model from the hundreds of options available, and to determine the corresponding financial arrangements.

Rocky Mountain Log Homes, a builder of prefabricated housing, has similarly redesigned its customer-ordering process. Previously, customers had to content themselves with one of a range of predesigned homes. Now, they can customise their own designs on screen, and the computer system feeds the designs straight to the factory. Bypassing the conventional order-taking departments cuts costs and reduces delays.

Otis Elevators now centrally coordinates the efforts of its nationwide repair force in the United States. When something goes wrong with one of Otis's newer-generation lifts, the fault is automatically diagnosed and registered on the central computer, without human intervention. Repair staff are contacted and despatched either by telephone or by pager. Once the maintenance work is complete, the relevant information is recorded centrally by the computer. The advantages to Otis are considerable compared with the old approach, which involved several separate functions at one of dozens of geographically distributed branches. Customer response time is speeded up, and particularly troublesome faults can be pinpointed. Senior managers can monitor the performance of maintenance workers across the nation, as well as by individual customer, and can direct sales and service attention accordingly.

Westinghouse, which builds power-generation equipment, has redesigned the procurement process of one of its major customers, Portland General Electric (PGE). The initiative began when PGE asked Westinghouse to help it implement an electronic link for exchanging trading data. (Electronic data interchange, or EDI, links of this sort are becoming increasingly popular, particularly in the United States.) The Westinghouse team reckoned that implementing EDI would yield overall efficiencies of around 10 per cent. Redesigning the overall procurement process to bypass the purchasing department altogether for most routine orders would yield far greater savings, however. The redesigned process was implemented, along with EDI. In one instance, the cost of ordering fell by a factor of nine, and the time delay from 15 days to half a day. Siemens has redesigned its parts-purchasing process

Buick has redesigned its customer purchasing process

Otis Elevators coordinates the efforts of its nationwide repair force

Westinghouse has redesigned the procurement process of one of its major customers

Batterymarch has designed its business around three strategic processes

SAS's new procedures mean that check-in staff can now respond fully to a passenger enquiry

Seven Eleven has reduced costs, saved time, and provides a better service

> Thorn Home Electronics has removed layers of functional management

Banking and finance

Batterymarch is an American investment-management firm specialising in contrarian investment (finding stocks out of favour with, or neglected by, other portfolio managers). The company has used information technology to help restructure its business around three so-called strategic processes — strategy development, portfolio construction, and account administration. Batterymarch compares itself with more conventional companies in the same line of business that are organised around the five functions of stock analysis, strategy, portfolio management, trading, and record keeping. Each of Batterymarch's strategic processes is heavily supported by information systems. As a result, Batterymarch enjoys aboveaverage performance for the industry. Relative to its asset base of \$12 billion, professional staff numbers are 50 per cent below industry norms, and the number of support staff has fallen to less than 20 per cent of industry norms.

At Phoenix Mutual, a life insurance company, five management layers have been replaced by a team of individual case workers. They handle most of the policy-processing steps that used to take place. What took anything from 5 to 25 days is now a 24-hour job.

Transport, distribution, and trading

SAS, the Scandinavian airline, has introduced a revised passenger check-in procedure. According to the chairman, Jan Carlzon, the typical customer comes into contact with five SAS employees a year, and the contact lasts, on average, only 15 seconds. This contact establishes a customer's perception of SAS, and it is these 'moments of truth' that ultimately determine whether SAS succeeds or fails as a business. The earlier step-by-step check-in procedure has been replaced by one in which each member of a 15-strong team has access to all flight information relevant to passengers, including transfer details, stopovers, flight times, and meal requests. Now, any one of the team can carry out the check-in process and respond fully to a passenger enquiry. It places more responsibility on the frontline staff, but enables them to provide a complete service without being constrained by functional or supervisory requirements.

Seven Eleven is a Japanese convenience-store chain. Most of the 3,900 stores are owned by franchise-holders. Instead of each franchisee calculating his own stock replenishment orders, this chore is carried out electronically by Seven Eleven. Its system of networked point-of-sale terminals not only tracks sales by item in each store, but also the sex and age of each buyer, and the time of day. Seven Eleven uses its computer to track sales patterns, arrange store deliveries three times a day, and calculate payments and receipts. It even advises each store manager how best to allocate shelf space hour by hour for maximum profit. The process cuts through the conventional functions of stock management, order processing, distribution, and accounting. It reduces costs, saves time, and provides franchisees with a better service.

Thorn Home Electronics specialises in renting consumer appliances through a chain of high-street stores. Thorn has significantly improved its bottom-line performance since the mid-1980s by stripping out layers of functional management and concentrating on streamlining the customer-service process. Stores are equipped with networked PCs to enable the staff to analyse sales data and to identify emerging and changing requirements patterns. The key database records are now organised by customer, rather than by rental equipment, as used to be the case. Thorn says that it has paid particular attention to the training and job enlargement of its store staff, enabling it to attract and retain better people.

Process working promises sustainable competitive advantage

The case histories illustrate the enormous benefits that may be gained from process working. The first is cost reduction, which goes hand-in-hand with improved productivity. Ford and MBL demonstrate the kind of improvement that is attainable when process management is coupled with redesign: productivity has been more than doubled.

The second main benefit is improved customer responsiveness. The improvement manifests itself in different ways, all of which lead eventually to increased sales. Perhaps the most obvious is a reduction in delays. Better service is another form of improved responsiveness. The MBL case is, again, a good illustration of this. Rather than having to deal with different company representatives, depending on the nature of their enquiry, MBL's customers now need meet only one — their case manager.

Other benefits of process working include greater flexibility and the ability to adapt to changed circumstances — a result of independence from hierarchical rigidities. Responsiveness and flexibility are characteristics that are often associated with small companies unencumbered by bureaucracy. Indeed, large companies adopting process working are seeking to gain small-company responsiveness ("our customers want that small-company feeling", said several of our interviewees), while at the same time retaining the positive attributes of size — economies of scale, widespread recognition, and geographic scope.

Reduced cost and improved responsiveness follow from the elimination of multiple steps in the work flow in functional organisations. Instead of the work passing up and down hierarchies and across organisational boundaries, it stays with an individual or a team throughout the process. This leads directly to a third benefit of process management, improved quality of work life for employees. Blurred accountability and tunnel vision are endemic in functional organisations where people work only on pieces of a task. In process working, by contrast, individuals are empowered to carry out entire tasks from beginning to end. Moreover, the people who do the work undertake their own monitoring and control, and handle exceptions themselves. As a result, quality and service become real issues, not mere talking points. Staff are more challenged, and if they are able to cope with their widened responsibilities, become more fulfilled. Good staff may be easier to attract and retain.

For the companies able to realise them, these benefits add up to a considerable competitive advantage. Of course, process working can be replicated from company to company, but once it is implemented, companies will be able to adapt more readily to changing market Productivity can more than double as a result of process working

Large companies adopting process working are achieving smallcompany responsiveness

Process working empowers individuals to carry out entire tasks and competitive requirements. Process working provides a platform for continuing innovation. It promises competitive advantage that will be sustainable over time.

The 15 cases outlined so far in this report are all substantial companies that are well established, and that have traditionally been organised on functional lines. It is not possible to draw conclusions with any degree of rigour from this relatively small sample, but certain implications for management and for systems are clear. These are discussed in detail in Chapter 3.

Chapter 3

Managing and redesigning processes has far-reaching implications

Virtually every sizeable western business is organised by function. Although the approach has worked well for decades, its appropriateness for the changed circumstances of the 1990s is increasingly being questioned. Changing from functional to process management has major advantages, as we saw in Chapter 2, but the implications of the transition are far-reaching, for everyone in the business.

Organising by function has limitations

The hierarchically organised functional structure of today's large organisations has its roots in the early twentieth century. Unprecedented uncertainty in today's business environment is putting a premium on responsiveness and flexibility, however, for which the traditional functional structure is ill-adapted.

It would be wrong to think that the business environment has always been in a state of rapid change. For much of the past hundred years, it has been relatively stable, and today's management wisdom is based largely on the premise that it is possible to forecast accurately the direction and pace of change by extrapolating from past experience. Not long after industrialisation, a search began to improve business efficiency by concentrating on the routine aspects of work activities. That led, in turn, to Frederick Taylor's concept of 'scientific management', which advocated the systematic investigation of work methods, the separation of routine tasks from planning and control, and the substitution of machine power for man power. Although the concept was designed initially for factory-floor practice, its application spread progressively into most commercial activities.

Scientific management had two main goals. The first was to improve productivity without impairing quality. The second was to meet the customers' needs by providing standardised products that could be produced more efficiently because of the economies of scale.

The natural consequence of separating work activities into specialised elements was their formalisation as functions in the organisation structure of the business. Functional organisation was reinforced by the application of rigorous planning and work study, whose purpose was to deploy scarce expertise better, to set and maintain professional standards, and to monitor and control the flow of work. It has been undeniably successful. Over the period, there have been considerable improvements in the organisation of production. Such improvements yielded, for instance, a ten-fold increase in industrial productivity in the United States during the century ending in 1980.

Functional organisation has brought significant benefits...

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... but it leads to a loss of business flexibility A consequence of organising by function, however, was a loss of business flexibility — in terms of both productive capability and employee relations. In part, this was due to the separation of thought and action within the organisational hierarchy. Workers were put into fragmented jobs that, ideally, required little thought and were as repetitive as possible. In contrast, managers were supposed to do the thinking — to plan, make decisions, control procedures, monitor outputs, and handle exceptions to the routine.

During the 1980s, several fundamental and far-reaching changes started to take place. Markets became more fragmented, and as a result, companies began to tailor their products and services for particular customers. Dramatic changes began to occur in social values, demographic patterns, and political alliances. There was an increasing emphasis on design, quality, service, and international operations. Taken together, these changes signalled an era of unprecedented uncertainty, due in large part to the sheer diversity and momentum of the underlying forces for change and the complexity of their interaction. It has become increasingly clear that, for businesses to respond effectively to this uncertainty, they must radically rethink time-honoured concepts and practices.

The goal is dramatically improved flexibility and responsiveness. The problem is how to achieve that goal. The world is not short of management thinkers ready to expound on the subject. Peter Drucker, for instance, describes specialist knowledge workers brought together in task forces that cut across traditional departments, rendering unnecessary whole layers of management whose primary function is to act as little more than human relays. These intermediate layers are more of a cost burden than a source of added value. Rosabeth Moss Kanter, professor of business administration at the Harvard Business School, believes that businesses will have to become 'post-entrepreneurial'. The term describes the application of entrepreneurial principles within a framework of corporate discipline, cooperation, and team work.

According to Tom Peters, the consultant and author, giant firms can no longer behave as they used to. Quality, design, service, and competing in time require a fundamental reshaping of organisation, procedures, and attitudes. Old ideas about economies of scale are being challenged as medium-sized and small firms, often benefiting from partnership arrangements that would have been unthinkable 10 years ago, demonstrate that they can compete with the giants. Thus, single firms are giving way to cooperative networks, and line workers committed to constant improvement and continuous retraining are becoming critical for adding value.

Process working promises to be a viable alternative

A common characteristic of the visionary thinking referred to above is process, rather than functional, working. Processes have two important characteristics. They have customers — recipients of the output from the process who are either internal or external to the firm, and they cross organisational boundaries — the boundaries that separate different functions within an organisation, or that separate organisations. Common examples of processes include ordering and receiving goods from a supplier, preparing a competitive sales proposal, and servicing a customer.

Processes have customers and they cross organisational boundaries

In a conventional hierarchical organisation, taking and fulfilling a customer order, for example, typically involves multiple functions — sales, production, accounts, distribution, marketing, and so on. The order proceeds step by step as it passes between the functions. Queries and exceptions are handled at higher levels in the hierarchy (see Figure 3.1). For most of the time, the order waits in a queue. Viewed as a business process, taking and fulfilling a customer order involves the same set of work activities, but all these activities are managed as a single, coordinated operation, either by an individual, or by a team (see Figure 3.2).





Businesses that identify these processes and arrange the workflow accordingly are said to adopt process working. Process management describes the managerial aspects of process working. Process redesign entails rethinking and rearranging the work activities of which the process is composed. Once a company begins to see its business in terms of processes rather than functions, it can usually find ways in which the processes can be redesigned to cut costs and improve efficiency.

Processes can be classified in several ways. One is on the basis of scale. Thus, customer servicing is likely to be one of a dozen or so Once business processes have been identified, they can usually be improved macroprocesses in most businesses, whereas staff development is more likely to be a microprocess (of which there may be a hundred or more). Another is by nature: predominantly managerial, or predominantly operational. A third way (which is probably the most useful from the standpoint of systems design), is on the basis of scope: interorganisational, or interpersonal. Interorganisational processes take place between two or more separate businesses, generally linking supplier with customer. Ford's accounts-payable procedure, described in Chapter 2, is an example of a redesigned interorganisational business process. Interpersonal processes take place among small work groups. An example is the preparation of a sales proposal by specialists working in different offices but linked together electronically.

There are obstacles to the introduction of process working

Although the concept of process working can be stated simply, it is not easy to introduce. If it were, lots of businesses would be transforming themselves by adopting process working. Three major obstacles stand in the way.

The first is vested interests. Process working runs counter to conventional thinking about management progression. It overturns the idea that career advancement means scrambling up the traditional corporate ladder. Instead, it offers people the opportunity both of carrying out a challenging task more effectively, and of continually learning new skills that enable the work to be done better. Process working therefore changes completely the way that businesses motivate and encourage their employees, and in the way that individuals think about their own progression.

The second main problem lies in the choice of individuals to carry out the work. They need a wide range of skills, covering the functional skills that are replaced by process working. That may mean bringing individuals together into multidisciplinary teams. It is unlikely to be immediately clear where such individuals should come from within the business, and how to select and train them.

The third problem is that of providing individuals and team workers with the information required for process working. The flow of information through a process replaces the vertical inter-layer communications of the conventional hierarchical structure, traditionally carried out by middle managers. The information flow also delivers to the process workers the knowledge inherent in the replaced functional activities, such as when to accept an order, how to fulfil it, what to charge, and how to handle queries.

The provision of supporting information is critical to process working. It is only recently that information technology has matured sufficiently to make process working practical. There is also a corollary to this. Process working is the means by which the full potential of information systems can be realised. To see why this is so, it helps to understand the role of information in adding value to the business.

There are vested interests in traditional ways of working

Process working often requires multidisciplinary teams

> The provision of supporting information is critical to process working

Realising the full benefits of information technology means redesigning processes

Information is a source of potential added value. In most businesses, the critical value-adding activities are process-oriented. It is therefore easier to realise the added-value potential of information in a process-managed organisation than in a functional organisation.

Competitive advantage derives from the value chain

The work of Michael Porter, professor of business administration at the Harvard Business School, in explaining how firms can gain competitive advantage is by now well known. His value-chain concept is a useful aid to understanding the role of information, and hence, of information technology, in creating a product and delivering it to the market. The value chain systematically identifies nine discrete activities (grouped into primary activities and support activities) that a company performs in doing its business (see Figure 3.3). To gain competitive advantage over its rivals, a company must either perform these activities at lower cost, or perform them in a way that leads to differentiation and the ability to command a premium price.



The activities in the value chain are interdependent and connected by linkages. Information permeates both the value-chain activities and the linkages between them, and is therefore an important means of adding value, and hence, of driving cost reduction and differentiation.

The value chain of a company is embedded in a larger stream of activities known as the value system. The value system connects primary suppliers and intermediate suppliers to the final customers. Linkages connect the value activities of a given firm in the value system to those of its upstream suppliers and downstream customers (see Figure 3.4). Competitive advantage is created by coordinating or optimising these links, and information technology has an important role to play in this as well, as a source of added value. Information permeates value-chain activities and the linkages between them



Automating existing processes is of limited value

While information technology can play a role in a functional organisation, its ability to add value in such circumstances is ultimately constrained by the limitations inherent in the structure. Most information systems remain frozen within functional boundaries.

Nevertheless, information technology can add value in a functional organisation by helping to automate the functional activities themselves — for instance, by recording customer enquiries more quickly and accurately, or by tracking the stock level and bin locations of parts in a warehouse. Information technology can also add value by helping to reduce the layers of management in a hierarchical organisation by minimising the need for what Peter Drucker calls relays — the human boosters of faint, unfocused signals that pass for communications in many traditional large companies.

Some businesses have achieved notable success in 'delayering' stripping out excess layers of middle management — with the aid of information technology. Hercules Corporation, a geographically dispersed chemical company, claims to have cut seven layers of management through its use of a company-wide electronic information network, and in particular, through videoconferencing. Nucor, a specialist maker of steel, has annual sales of \$1 billion, a head-office staff of fewer than 20, and just three layers of management. Flattening the organisation means widening managers' span of control. Information technology can help to make that possible through management-information and decision-support systems.

Information technology can also add value in a functional organisation by improving interfunctional information flow. At Chemical Bank in New York, foreign exchange trading has become the most profitable activity. To improve the management of its worldwide trading operations, the bank has integrated closely its front-office functions (bookings and transactions) with the back-office functions (transaction clearance and settlement). Menichetti, an Italian textile group, has integrated its information systems across its eight strategic business units. The systems enable the business units to balance workloads and share market data, while retaining their independence.

In a functional organisation, therefore, systems help to improve the flow of work through the functions, but do little to improve linkages between them. Moreover, most computer systems are designed to meet a specified set of rigid requirements, and are very hard to change. The inflexibility of the technology tends to reinforce departmental divisions, setting them in electronic concrete.

It is partly for this reason that information technology's overall success to date in improving white-collar productivity has been disappointing. Information technology is now the largest single source

Information technology helps to reduce the number of management levels

> Information technology can improve interfunctional information flow ...

... but it can also reinforce departmental divisions of capital investment in business. One estimate puts the share of office equipment in American companies' stocks of fixed capital (excluding property) at 18 per cent, up from 3 per cent only 10 years ago. Yet despite this massive investment, white-collar productivity is no higher in the United States than it was in the early 1960s, according to Stephen Roach, an economist at Morgan Stanley. The management delayering that has taken place in many companies during the past 10 years has been accompanied by a growth in information workers (and managers) elsewhere.

In a process-managed organisation, information technology can be fully exploited

The functional divisions in traditional hierarchical organisations rarely align with the value activities of the value chain. For the most part, functional organisations have been created on the basis of internal efficiency and control. Yet it is in the areas of design, quality, and customer service that firms today are trying to compete by cutting costs and differentiating, and it is here that added value is most needed. In most firms, the critical activities are now processoriented, not functionally oriented.

Take the primary value activity of service, for instance, that is shown in Figure 3.3. In many large companies, it equates to a process, yet it is handled by functional parts of the organisation such as installation, repair, adjustment, upgrading, and parts-inventory management, as well as sales, and accounting.

Systems that support processes are designed from the outset to cut across functional boundaries. Moreover, information systems can actually create new process-design opportunities, rather than merely support the processes that already exist. In applying its new computer system to the accounts-payable process, Ford did more than merely automate the existing procedure. It took advantage of information technology to redesign the process, doing away with invoices altogether.

As many of our case histories illustrate, it is often because of the capabilities of information technology that processes can be redesigned and made far more effective. In leading-edge practice, information technology and the redesign of business processes have an iterative relationship (see Figure 3.5). Each is the key to thinking about the other. Business processes and process improvements should be considered in terms of the capabilities that information technology can provide.

Together, information technology and the redesign of business processes have the potential to increase the added value of information radically, and hence, the ability of firms to take advantage of information technology as a means of cost cutting and differentiation. This applies not only within a business, but also to the value system beyond it (see Figure 3.6).

The roles of managers and the systems function will be profoundly affected

Organising by process, rather than by function, has extensive implications for senior executives, middle managers, and operating staff, as well as for the systems function itself. In most companies, the critical activities are now processoriented, not functionally oriented

Information systems can create new process-design opportunities

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Implications for executives, managers, and operating staff

Few senior executives think about their business operations in terms of processes. Fewer still recognise that processes can be redesigned, with or without information technology.

For executives to start thinking in these terms demands not only vision, but great confidence and conviction as well. Leadership must come from the top, and tight central control must be exercised. After all, a transition to process management means breaking away from fundamental rules and cherished assumptions that underlie existing operations. A full transformation of the business is likely to be a lengthy task, probably taking at least several years. The period is bound to be one of instability and turbulence.

Often, process working means a significant cultural change for the organisation — something that is hard to achieve in a relatively short time. Businesses implementing process working are therefore generally doing so one process at a time. They are introducing a matrix organisational arrangement, retaining their existing

Leadership in the move to process management must come from the top functional hierarchies, but complementing them with crossfunctional teams. To proceed on a broader front would be too disruptive to be manageable.

Process working means changing roles, and possibly dispensing with some middle managers. The restructuring of power and status in the workforce presents an opportunity for some staff, and a threat to others. Flattening hierarchies and introducing cross-functional teams threatens job security and status, and questions values that have been enshrined over years. On the other hand, process working leads to the formation of teams of individuals empowered with considerable discretion. This change to the normal pattern of working places a heavy burden on those responsible for staff selection and training, a subject that is discussed further in Chapter 4.

Implications for the systems function

For systems professionals, the introduction of process management means new computer applications, new ways of working, and new responsibilities. New applications are virtually certain to be needed. Process management means sharing information, placing a heavy emphasis on integration — of workstations, networks, databases, and applications software — across functional boundaries. For many organisations, an immediate issue is whether to build on existing systems or to scrap them and create entirely new systems from scratch. Either way, the need will be greater than ever for applications that can be developed quickly, and that, once in service, can be adjusted easily to meet changing requirements.

A major responsibility for the systems department in a processworking environment is that of devising a common technical architecture — a consistent set of rules and standards — and putting it in place and ensuring that it is used. This is the primary role of a central systems group. The requirement for speedily developed and flexible applications conforming with the architecture also raises major technical questions, as we go on to discuss in Chapter 5. Process working will be an opportunity for some staff and a threat to others

For systems staff, process working will mean new ways of working, and new responsibilities

Chapter 4

A five-stage programme provides a basis for introducing process working

Experience with business-process management, and particularly with process redesign, is limited. Few if any methods exist, at least in the public domain, to provide guidelines for an organisation wanting to move forward in this area. The case histories and analysis in Chapters 2 and 3 point to five important factors that are critical for success in implementing process working: a clear strategic vision of what can be achieved; an understanding of the main processes in the business and their potential to add value; recognition of the implications of process working on the management structure of the business; the creation of cross-functional teams of trained individuals carrying out jobs that are redesigned; the development of new or extensively reworked information systems.

These factors form the outline of a five-stage programme, illustrated in Figure 4.1, that businesses might use as a starting point for



developing their own more detailed methods. Although there is a flow from the first to the fifth stage, each stage influences all of the others (we pointed out, in Chapter 3, the strong iterative relationship that exists between Stages 3 and 5). The model applies not only when a business first changes from a functional to a process-management style, but also thereafter, as it undergoes continuous change and improvement. A task force (shown in broken lines in the figure) has a role to play in assisting change at each of the five stages.

Develop a business vision and objectives

The businesses we have examined place great emphasis on the development and communication of a broad strategic vision of how things might be. That vision has to come from the chief executive. Because process working challenges the vested interests and ingrained way of working of the organisation's management structure, the full allegiance of the top management team is essential, too. Only if top managers back the vision and outlast the company's cynics will process management have a chance of succeeding.

In the companies we visited, there was also widespread appreciation of the need for change of some kind. Thus, a readiness for change, which is a necessary precondition of a successful transition to process management, already existed. In most cases, the need for change was a consequence of considerable competitive pressure eroding market share and margins. There were exceptions, however. In two instances, the decision to move to process working was prompted by a simultaneous drive to globalisation. Both changes required radical reorganisation. Making them together would reduce the overall disruption.

Even so, the nature and scale of the required changes were bitterly contested in several organisations. The vision of a significantly different business challenges many widely and deeply held beliefs about culture and management practice, and many managers have difficulty accepting and committing to it. Widespread participation in the development of the vision is the key to its acceptance. If employees participate, they understand the need for changes and the logic behind new arrangements. Trust is built up by ensuring that staff are aware of the realities of the competitive environment.

In general, the vision implied specific objectives for process redesign, aligning with one or more of the three purposes set out in Chapter 2: cost reduction through increased productivity, improved responsiveness, and greater staff satisfaction. The emphasis placed on these objectives varied from case to case, but the businesses we talked to found it important to be specific about them. They all agreed that it is virtually impossible to embark on a major programme of change without being able to state the reason in terms that are clear and unequivocal. Moreover, teams perform best when they have unambiguous goals. The objectives were sufficiently demanding that major change was mandated, yet they were also clearly within reach once the need for change was accepted.

The transition from functional to process management is not amenable to financial justification in the same way as an The full allegiance of the top management team is essential

Widespread participation in the development of the vision is the key to its acceptance investment in a new machine tool, for example. A formal payback assessment is simply inappropriate. For one thing, it is difficult to estimate the costs in advance. Some elements, such as the cost of disruption, are virtually unquantifiable, and the costs of training, support, and systems are difficult to predict. Nor are the benefits easy to calculate in advance.

The case for change is very much a matter of top management judgement. For some senior executives, the issue is not so much whether to embark on the transition, but when. Some of the people we interviewed shared the view that most, if not all, businesses are going to have to change to process working at some stage. Companies feeling threatened in one way or another — as all our cases were — may believe that the risks of pioneering are already outweighed by the risks of continuing with business as usual.

Identify and redesign business processes

Because managers do not usually think in terms of processes, few businesses have identified their existing processes, and fewer still have measured the outcome — in terms such as cost, timing, and quality. The first step is to identify the existing processes. They may be hidden by the functional structure, but they undoubtedly exist.

The existing processes may be identified by a task force, or alternatively, at a management workshop. The aim is to list a small number of macroprocesses, say between 3 and 20, depending on the business. The existing processes should then be assessed in terms of their ability to meet the objectives sought for the posttransition period — most commonly, lower cost, faster response times, and better quality. This assessment serves as a yardstick by which redesigned processes can be judged. It also helps to ensure that problems inherent in existing procedures are understood, so that they are not repeated.

It is unwise to implement process working across the board all at once. A less risky (though still disruptive) piecemeal approach should be taken, tackling one process at a time. It follows that priorities should be allocated for redesigning and implementing the various processes. The obvious way to do this is on the basis of potential added value, in terms of objectives such as cost saving or time reduction. If our analysis of cases in Chapter 2 is any guide, many businesses will find customer service and satisfaction to be a high priority. An alternative is to set priorities on the basis of ease of implementation. It may make sense to start with the easiest process, and to advance from that point to more challenging processes with the benefit of experience.

A further criterion for selecting the process to tackle first is the complexity of process interrelationships. This is obviously important for businesses whose long-term aim is to transform themselves to process management across the board. As we have pointed out already, that is a goal that few large businesses are likely to achieve quickly. For most, particularly large and complex businesses, one or two process transitions a year is likely to be more than enough to manage.

Most large businesses will be unable to manage more than two process transitions a year Redesign goes hand in glove with setting priorities. Unless managers can envisage what is possible through redesign (and what the consequences are), priorities are virtually meaningless. Brainstorming sessions are a useful way of creating pointers for redesign. Redesign itself is likely to require inputs from specialists with particular expertise in industrial engineering, business management, quality improvement, and information systems.

The contribution of information technology to process redesign will obviously depend on the process itself. The approach taken by Dow was to identify, for each process, a set of 'tactical actions' crucial to the realisation of the process goals (see Figure 4.2). For each tactical action, the Dow managers, in association with systems staff, assessed two systems factors. One was the contribution that existing systems made to each tactical action; the other was the potential contribution that information systems could make. The difference between the two enabled systems staff to plan a programme of system rebuilding.



Establish the revised management structure

A crucial element in the introduction of process working is planning how to fit it into the management structure. There is a view that functional hierarchical structures will give way to small entrepreneurial teams of specialist knowledge workers tied together electronically in a so-called network (or organic) organisation (see Figure 4.3). That may happen eventually in some businesses, but for most, it is a long way off. Indeed, it may never be realised. In place of such an egalitarian peer network, an arrangement of teams coordinated by a simplified management hierarchy is more probable (see Figure 4.4). Even this arrangement, however, is unlikely to Redesigning business processes is likely to require inputs from specialists Chapter 4 A five-stage programme provides a basis for introducing process working



Figure 4.3 The network organisation dispenses altogether with a



In large businesses, a hybrid structure of functional and network organisations is likely to emerge

BUTLER COX FOUNDATION © Butler Cox plc 1991 be realised in more than a few large businesses in the 1990s, although it may become a feature of a growing number of small ones. In large businesses, a hybrid of functional and network organisations is more likely to emerge (see Figure 4.5, overleaf).

With a hybrid structure, businesses will aim to get the best of two worlds. Specialist cross-functional, process-oriented teams will provide the responsiveness — the feeling of smallness — that large companies are increasingly looking for. A functional hierarchy will provide the mechanism through which team goals are set and team performance is measured, as well as the means for coordinating team activities and setting the strategic direction of the business as a whole. The hierarchy will define rights and responsibilities, instil discipline, set objectives, and convey cultural values.

The resulting hybrid organisation will display some of the characteristics peculiar to the conventional functional organisation, and some that are peculiar to the network organisation (see Figure 4.6, overleaf). Companies adopting this hybrid organisation



Figure 4.6 Fund feat	ctional and network organisations ures	have contrasting
Element	Functional organisation*	Network organisation*
Channels of communication	Highly structured Controlled information flow	Open; free flow of information
Operating style	Must be uniform and restricted	Allowed to vary freely
Authority for decisions	Based on formal line- management position	Based on expertise of the individual
Adaptability	Reluctant, with insistence on holding fast to tried and tested principles in spite of changes in circumstances.	Free, in response to changing circumstances
Work emphasis	On formal, laid-down procedures	On getting things done, unconstrained by formality
Control	Tight, through sophisticated control systems	Loose and informal, with emphasis on cooperation
Behaviour	Constrained, and required to conform to job description	Flexible, and shaped by the individual to meet the needs of the situation and personality
Participation	Superiors make decisions with minimum consultation and minimum involvement of subordinates	Participation and group consensus frequently used
* In the source article, the authors refer to the organisational types as 'mechanistic' and 'organic', respectively.		
(Source: Slevin, D P, and Colvin, J G. Juggling entrepreneurial style and organizational structure: how to get your act together. <i>Sloan Management Review</i> , vol. 31, no. 2, Winter 1990, p.43-53.)		

will retain their existing functional management structure in a modified form, complementing it with process teams reporting to one or more process heads, or owners. The latter are executives of at least equivalent rank to the functional heads affected by the process. They should be convinced of the need for change, have a Chapter 4 A five-stage programme provides a basis for introducing process working

strong innovative streak, and champion the process-management concept. As well as carrying responsibility for the process teams that they control, owners should be able to work as facilitators. Since they will have no direct authority over functional managers, they will exert much of their influence by persuasion rather than by instruction. Selecting a process owner from among existing functional managers is unlikely to be easy.

Reporting links will exist between a process owner and the heads of functions affected by the process. Conceptually, the arrangement is not dissimilar to the well known matrix structure first favoured in the 1960s and now well entrenched in many businesses. Such businesses will find it easier to adopt a hybrid functional/process organisation than those lacking experience of matrix management. Dow Europe is a case in point. A protagonist of matrix structures for years, Dow Europe plans to take advantage of this type of structure in developing a hybrid functional/process organisation.

Businesses that are introducing process management rightly place considerable emphasis on the management of change at every stage in the transition. A good way to focus attention and action on this is to set up a multidisciplinary task force. It should be assembled from staff representing the functions crossed by or involved in the process (including external businesses when appropriate), together with specialists from different backgrounds. The specialist areas will certainly include systems, probably industrial engineering, and possibly industrial psychology as well. Ideally, the task force should report to a senior executive closely involved in the creation of the business vision.

Some companies appoint 'shepherds' to ease the transition to process management. These are high-level staff with a project brief, and they complement, or even lead, the task force. Occasionally, shepherds and owners may be one and the same. Shepherds, who are likely to have a background in systems, are not uncommon in functional organisations that are trying to introduce information sharing and systems integration across functional boundaries, sometimes as a preliminary step to introducing process management.

Process-managed companies will typically be less diversified than many traditional groups. Businesses with an existing centralised management style will be better placed than others to make the transition. As Rosabeth Moss Kanter has put it, "to move from simply adding value to multiplying it, these companies will build connections between their various products and businesses, encouraging such cooperative efforts as cross-selling, product links in the marketplace, the exchange of technological or market information, resource sharing in order to apply one unit's competence to another's problems, and letting each division serve as the lead for particular innovations". Groups whose business units are used to acting independently will find it difficult to put these ideas into practice.

Gain staff commitment

For the staff involved, in particular, process working entails a significant change of role. In turn, that implies a need for concerted training and support.

Businesses with a matrix structure will find it easier to adopt a hybrid structure

Businesses with a centralised management style will find it easier to move to process management Chapter 4 A five-stage programme provides a basis for introducing process working

Changes in the roles of staff

In process working, action is delegated to staff who have traditionally comprised the rule-following lower layer of the hierarchical pyramid. At the customer interface, for instance, employees in a process-managed business are given the discretion to respond to the individual (and probably non-standard) needs and problems of customers.

Because the activities of a process consist of the elements usually broken down into functions, it is more varied than functional work. The work also has built into it the activities normally carried out in upper layers of the hierarchy — the handling of exceptional, nonroutine activities, as well as monitoring and supervisory controls. It follows that the jobs of the individuals involved will have to be redesigned to take account of the unusually broad scope of process working.

For process teams to work effectively, they have to be empowered to carry out the full breadth of work. That means putting the decision point where the work is performed. An example comes from British Airways. It has eliminated the office functions required to process customer claims for dry cleaning, and so on, that result from in-flight accidents, by empowering the cabin crew to issue cleaning vouchers. The procedure has not only saved money; it has also had a positive impact on customer satisfaction.

In many cases, individuals will be empowered by having access to appropriate information systems. An important consideration in designing systems to support process working is that of work monitoring. One aim of job redesign is to encourage self-monitoring by the team members, so that individuals can measure their own performance and modify it if necessary. Information systems that are perceived by team members to police their activities are usually counter-productive. An illustration of this is provided by Redline, a division of Thorn Home Electronics, with responsibility for the servicing of home electrical equipment. One of its computer systems projects, designed to streamline working methods and improve decision-making by front-line employees, featured a policing element that imposed discipline. It was implemented within the existing organisational structure, with few changes to the reward basis or the approach to performance measurement. Worse, information from the system was used to catch out employees. This system failed, but important lessons were learned that were put to good practice in Thorn's later development.

Training and support

Few people in a company will welcome process management and redesign. It means an inevitable revision of power, status, and roles. It is confusing and disruptive. It turns beliefs and values on their head. Strong resistance to the changes resulting from the introduction of process management is a certainty, at all levels. The pioneering companies we have studied have found the task of gaining commitment and support to be a lengthy, and at times, a confused and bitter one.

Particular resistance was encountered among two groups. One was functional managers, fearing the erosion of their traditional sources Process working gives employees the discretion to respond to nonstandard situations

Individuals will be empowered by having access to appropriate information systems...

... but the systems must not be perceived as having a policing element of status and power. The other was employee representative groups, such as unions, that have based their bargaining approach on the characteristics and values of the traditional organisation.

Overcoming resistance and gaining commitment is not a simple matter, but the following actions are usually helpful:

- Focusing the attention of everyone in the business on important business problems, such as reduced profits, poor quality, or loss of market share. A competitive crisis makes this task easier, but when a crisis is not visible, managers have found that sharing information with employees about competitive threats to the business motivates managers, unions, and workers alike.
- Seeking opportunities to involve staff in refining strategy, seeking options, and solving problems — even when this may seem to take longer than would otherwise be the case. Involving staff in the design of the new organisation helps to overcome their resistance.
- Communicating plans and proposals to all staff in a style to which they can relate, and which meets their needs. We spoke to several companies that concluded, on reflection, that their communication problems have had more to do with style than with the content or frequency of the messages.

Overcoming staff resistance is a prerequisite to the introduction of process working, as is training, to ensure that staff understand the new way of doing things and learn the intricacies of the processsupporting information systems. Training is likely to be the biggest single cost item in adopting process management. Self-development can be an important aid. For example, one business has provided staff in its retail outlets with low-cost computer facilities so that they can learn, for themselves, how to analyse their own customers' buying habits. This initiative has led to a successful restructuring of jobs, resulting in higher levels of customer satisfaction as well as employee satisfaction.

Develop new cross-functional information systems

Redesigning business processes, empowering individuals, and putting the decision point where the work is performed, would all be impractical without information technology. New computer applications are certain to be needed. Ideally, they will integrate existing functional systems, and be built on top of them. They may well make use of new technologies, and their design is likely to emphasise local (as opposed to centralised) processing power. By their nature, these applications will put a premium on design flexibility, rapid development, and technical standards for interworking. We expand on these points in Chapter 5.

Training is likely to be the biggest single cost item in adopting process management

Chapter 5

The systems function has a role to play throughout the programme

Information technology is more than merely a tool to support business processes: it is the essential ingredient of redesigned processes, and is therefore fundamental to any large-scale transition to process working. Staff at all levels in the systems function will be involved throughout the transition programme, although clearly, their involvement will be greatest in Stage 5, when new information systems are being developed. In the early stages of the programme, staff may be required to contribute in areas that their traditional roles have seldom required. In Stage 5, the changes will be more a question of perspective; process working will require a greater emphasis on speed and flexibility of delivery, and on the development of new, rather than modified, systems that can interwork across functional boundaries.

The systems director will have a role as influencer

Despite the central role of information technology in an organisation's transition to process management, it is rare for that transition to be led by the systems director. Systems departments usually lack the power and influence to spearhead such a transition; that responsibility is better discharged by senior line executives, as we pointed out in Chapter 4. In developing a business vision, however, the systems director can make an important contribution to the thinking of senior management by explaining both the nature of the structural changes needed to capitalise on systems integration, and the role of information technology in redesigned business processes. He may also manage the team effort that is central to planning and implementation. It is a role that positions the systems director as the guardian of what is increasingly becoming known as a business's 'alignment' - the harmonisation of its strategy, structure, and information technology efforts to get the best from all of them.

Systems staff will be involved in multidisciplinary team working

The multidisciplinary team, described in Chapter 4, acts as an agent of change, and will include people with backgrounds in specialist areas such as work planning, behavioural science, incentive-scheme design, and information systems. Some of the tasks suited to staff with backgrounds in systems are set out in Figure 5.1. With their experience of systems analysis, for instance, systems staff should be particularly well qualified to help with the analysis and redesign The systems director should contribute to developing the business vision

Systems staff are well qualified to analyse and redesign processes

Figure 5.1 There are opportunities	for the systems func	tion in all five stages of the transit	ion programme
	Opportunity for systems director	Opportunity for systems department	Opportunity for systems specialists in task force
Stage 1: Develop business vision and objectives	Help create the vision	Use information technology to help communicate the vision	
Stage 2: Identify and redesign business processes		Provide insights about system possibilities	Analyse existing processes Redesign processes
Stage 3: Establish revised			Analyse alternative structures
Stage 4: Gain staff commitment			Redesign jobs Determine performance requirements Provide training
Stage 5: Develop new information systems	1	Select technical standards Explore new technologies Build new systems	Define system requirements Help with system implemen- tation

required to support those processes.

Multidisciplinary specialists may be assembled in the systems department

> Systems staff must learn to collaborate with other specialists

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An alternative to establishing a separate task force is to assemble the multidisciplinary specialists in the systems department. Federal Express, the overnight parcel distributor, has done just this. It has renamed its industrial engineering group 'the strategic integrated systems group' and placed it within the systems department. Fokker, the Dutch aircraft manufacturer, has set up multidisciplinary business-engineering teams within its major divisions. The teams include specialists in organisation development and human-resource management as well as information systems, so that each business can call on specialists equipped to develop systems, organisation structures, and jobs that are in harmony. A similar approach has been adopted by Dowty, an aerospace and electronics group, as part of its drive to change itself from an engineering-led business into one that is driven by customer and market factors.

of processes, and to define the information systems that will be

Working as part of a multidisciplinary team will be a new experience for some systems staff. They are used to working on projects that are typically led by a project manager from the systems department, and they have been responsible for the design, development, implementation, and operation of the system. Often, systems staff are not particularly adept at collaborating with other specialists. In process projects, that will have to change.

There will be a greater demand for speed and flexibility

Businesses adopting process management are entering a period of continuous innovation, which will be reflected in a demand for application systems that are both speedily delivered and highly flexible. This means that the systems department will need to make greater use of application packages and contemporary system building tools, and will need to design systems in the knowledge that they are never really finished.

Achieving speed of delivery

Using application packages is the most obvious response to demands for faster delivery of systems. Unfortunately, many packages were designed to support individual functional activities, not full business processes. Some packages, however, come as part of an integrated set designed to cover most of the functions in a typical business, and it may well be that they can be used to support a process environment. For instance, SAP, a German software company, markets an integrated set of application modules that can be fitted together to cover most of the planning and operating activities of a wide range of industrial and commercial businesses. SAP's packages are being adopted by Dow Europe as the basis of its process-supporting systems.

The second way to develop systems rapidly is to use high-productivity contemporary system building tools such as fourth-generation languages and computer-assisted software engineering (CASE). If anything, tools of this sort slow down the rate at which programmers produce code (according to extensive research by Butler Cox through its Productivity Enhancement Programme). Each line of a programmer's source code, however, generates 10 times more object code than does a third-generation language such as Cobol.

A prototyping approach to systems development also speeds up the delivery rate for new applications. A rough-and-ready prototype can be built as a demonstrator and may then either be scrapped or developed properly. Some organisations are using fourth-generation languages in conjunction with CASE tools for prototyping. CASE tools can be used to carry out the business analysis and to produce the business specifications that are an essential starting point for the first prototype. Some CASE products are designed with process modelling in mind. The ability to draw models quickly and to make rapid changes speeds up the redesign of business processes and helps gain commitment. Once the business analysis has been completed, fourth-generation languages can be used to develop the application in full. Fourth-generation languages and CASE tools do have disadvantages, however. In particular, they require the systems department to adopt new working practices.

A sure way of reducing systems development time, whether or not contemporary tools are used, is to apply the 80-20 rule to the systems specification. Experience has shown that accepting a system that meets about 80 per cent of the requirements can reduce the development effort and time significantly.

New development techniques, such as those based on object-oriented concepts, also promise to reduce the effort and time required to develop an application. Techniques such as these will be essential if applications to support process working are to be developed in acceptable timescales.

Achieving flexibility

Too often, the normal approach of systems staff to development projects has been to constrain the flexibility of system design for technical reasons, and to freeze the system specification as soon as possible. It is a dangerous approach, and one that is wholly inappropriate to designing systems to support business processes. Development effort can be reduced by applying the 80-20 rule

Systems to support process management are never really finished Continuous innovation, driven by the business itself, is the pattern of process working.

Part of the solution to this problem lies in recognising that systems evolve. Instead of the well known 'waterfall' model of systems development (see Figure 5.2), some systems departments are adopting the 'spiral' model, shown in Figure 5.3, overleaf. Implicit in this model is the idea that a system is never really finished: it merely passes through successive cycles of design, implementation, testing, and improvement.



Michael Porter proposes a hierarchy of impacts of IT on the activities in the value chain

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This concept is reflected in the latest thinking of Michael Porter, whose value chain ideas are described briefly in Chapter 3. He has proposed the existence of a hierarchy of impacts of information technology on the activities in the value chain. As Figure 5.4 (overleaf) shows, a business will progress through this hierarchy over time. At the lowest level, information technology is used to automate an activity in its current form, but without changing the steps of which the activity is composed. At the highest level, equivalent to information-technology-enabled process redesign, the activity becomes re-configured, and performed in an entirely different way. According to Michael Porter, the level in the hierarchy determines the complexity of systems development. The hierarchy also implies that systems requirements will evolve over time, which means that low-order systems must be flexible so that they can be modified as the requirements change.

Allen-Bradley, a US-based maker of industrial controls, provides a case in point. The company first automated its order processing and accounting functions to reduce paper flow. It then saw a way to provide distributors with computer terminals to link order processing and accounting. At the same time, Allen-Bradley reconfigured its manufacturing operations by constructing a computer-integrated manufacturing facility for its line of industrial contacts and relays. This reduced paper flow, decreased processing



Figure 5.4	There is a hierarchy of impacts of information technology on the activities in the value chain	1

Level in hierarchy	Description	Example	
1 Automate the activity in its current form	Steps performed with a computer are essentially the same as when the activity was manual	Automated counting of merchandis	
2 Optimise the activity in its current form	Additional tasks are performed within the activity relative to manual or automated process: — Measure more variables — Control more precisely — Adapt and learn (for example, artificial intelligence)	Computerised process control	
3 Enhance the tasks carried out as part of the activity	Automated tasks are improved: — Add flexibility — Add information content — Add services/features	Computer-aided manufacturing	
4 Coordinate with similar activities that are geographically spread	Geographic locations where the activity is performed are coordinated through the use of information technology	Global manufacturing system International account manage- ment system	
5 Link the activity to others inside and outside the firm	Two separate value activities are linked through information technology, either within the firm's value chain or in the value system	System linking the sales force to manufacturing scheduling	
6 Share the activity with other business units or geographic regions	An activity in the firm's value chain is shared with another value chain in the corporate set of value chains	Shared computerised warehouse	
7 Reconfigure the activity to perform it in entirely new ways	Activity and value chain look very different from previous process: — Different steps — Different sequence of steps — Fewer steps	Remote diagnostics and servicing	

time, and increased the speed and flexibility of manufacturing. These lower- and middle-level systems then became building blocks for a higher-order system that linked ordering, processing, and manufacturing. Orders were downloaded from distributors' terminals directly to a computer on the factory floor each morning. Allen-Bradley is now able to process orders, manufacture, and ship products within 24 hours. The company has dramatically reduced its entire manufacturing cycle time.

The same fourth-generation languages and CASE tools that help speed up development are valuable aids to creating flexible systems that can evolve, because they enable changes to be incorporated rapidly. Structured and object-oriented design methods also help in handling design complexities and make changes more manageable. These methods enable systems to be built in modules, facilitating the job of removing and rewriting some parts while leaving the remainder intact.

Building on the existing applications portfolio will not always be a valid option

There are problems, however, in building on the existing applications portfolio. The first problem concerns the lack of robustness in existing systems. Patched-up to breaking point, extended over the years, and usually poorly documented, these systems are often a shaky foundation on which to build. A further problem arises from the lack of compatibility between existing systems. In an effort to devolve systems development to divisional or even departmental level, many businesses have in fact encouraged the growth of systems that are incompatible. In a process-managed business, it is essential that systems be integrated, and this will be a problem for many companies.

There will also be a need to accommodate new technologies that will have an important role to play in supporting process working, and it will be difficult to do this within the framework of the existing applications portfolio. Electronic document management (EDM) systems are a good example. EDM enables documents combining text, numbers, drawings, and photographs (compound documents) to be accessed from storage, worked on by several people together, and transmitted somewhere else, all electronically. Citibank Savings, part of the American Citicorp financial services organisation, uses EDM in one of its cross-functional systems. Once a loan has been approved by an underwriter, EDM is used to support all the subsequent aspects of mortgage processing - funds transfer, insurance, customer service, and redemption. Customer documents are now scanned and indexed into the EDM system, and are available for simultaneous inspection within 20 seconds of a request being made. The old manual procedure took at least 24 hours.

A further example of a process-supporting technology is electronic data interchange (EDI), which is gaining rapidly in popularity as a means of cross-linking organisations electronically for the purpose of exchanging trading and payment information. The latest applications of EDI are binding the value chains of individual companies into complex value systems. Thus, retailers of apparel in the United States are linked upstream to apparel manufacturers,

Object-oriented design can make changes more manageable

> Existing systems are often a shaky foundation

New process-supporting technologies will have to be accommodated who are, in turn, linked to cloth makers, and they, in turn, are linked to the companies that make textiles.

Applications based on EDI are beginning to open up a new area of immense potential — the electronic marketplace. It will link suppliers and customers in a complex web of relationships. In the United Kingdom, for example, a system known as Formtrac, from AT&T ISTEL, links large users of stationery forms to several suppliers. Users can seek price and delivery quotations through the Formtrac network, place orders, and make payments, all electronically. Systems such as these will encourage suppliers and customers alike to look much more closely at their interorganisational processes in future.

Other process-supporting technologies include videoconferencing, electronic mail, and groupware (software that helps dispersed individuals and teams to work more closely together by supervising such things as decision-making and progress reporting).

Systems based on these new technologies provide teams with powerful support, where much of the computing power will reside in the workstations used by team members, rather than in central computer systems. Indeed, mainframe-based systems will be an expensive and inefficient means of providing the dedicated processing power that individual process-team members will require. This will encourage the adoption of the so-called 'client-server architecture', where the workstation is the client that requests services (database access, for example) from a mainframe server. (Client-server architectures will be described in detail in the next Foundation Report.) Client-server arrangements cannot be implemented, however, without a set of standards with which all new systems should comply. This implies a strong measure of control over such standards, and raises difficult questions, not only about the form that control should take, but also about the standards themselves.

A central systems unit will be the custodian of the business's technical architecture

A technical architecture is a set of rules and standards defining how information systems are to work, from the way that communications networks fit together, to data definitions and the way that information is to be displayed on a screen. A company's technical architecture must protect its existing information technology investment, preserve the opportunity to adopt new technologies in future, and make possible the future integration of the components of computing, telecommunications, and information system resources. The technical architecture is the key to systems flexibility and adaptability. Without it, integrating systems to support process working is virtually impossible.

Most large companies now recognise the need for a coherent, groupwide technical architecture. A case in point is Sweden Post, the Swedish post office. The control of its technical architecture is contained within a wider, four-level plan for controlling information technology applications (see Figure 5.5). The top layer, called the information technology infrastructure, specifies both the rules and standards of a technical architecture, and the infrastructure of Mainframe-based systems will be an inefficient means of providing the required processing power

The technical architecture is the key to systems flexibility and adaptability



computers and communications. Standards are defined for data structures, data communications, security, systems development methods, maintenance methods, project control, and operating systems. The top layer also includes a set of policies covering such topics as human resourcing and the acquisition of information technology. Below that comes a layer called information support. This layer ensures that data is made available in a standard format to meet the needs of applications. This is achieved by ensuring that data conforms with the predetermined rules for collection, processing, and presentation. The activities associated with both of the top layers are led by the systems department; it carries clear responsibility for the group's technical architecture.

The bottom two layers of the four-level plan are business-led. The uppermost of these two is the applications layer. Applications are defined for each of the five operating divisions in Sweden Post, and are under the control of local managers. The lowest layer is concerned with operations at the business-unit level, and specifies the procedures for operating applications, and for maintaining and enhancing them.

Sweden Post provides an illustration of a general point — to exercise control across the business's use of information technology, there has to be a centralised component of the systems function, with responsibility for specifying the technical architecture. Sometimes, it will make sense for the same central unit to take control of the systems infrastructure, installing and operating the computers and networks across the group. The alternative is for one or more of the operating divisions to take on this role. Applications can be developed and maintained at divisional level to ensure that they conform with the technical architecture. Thus, although systems may be designed in isolation from one another at divisional level, they can interwork with each other as and when needed to support cross-functional process working.

A centralised component of the systems function must specify the technical architecture

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A major challenge for the central systems unit is that of defining what the technical architecture should be. There are two practical difficulties. The first is the need to allow for the diversity of systems and technologies likely to be already in place. The second is the absence of clear direction from the information technology industry itself. Open standards promise an end to the incompatibility and muddle of today's systems, but relevant standards will not be defined and implemented easily or quickly. There is widespread uncertainty and controversy about many of the details of open standards, as well as about the capabilities and commitments of individual suppliers, and the promises and risks of integration.

Proprietary solutions offer an alternative, but no less risky, path. Even IBM itself is not finding the going easy for its own internal use. IBM already has a major investment in systems infrastructure. It has one of the largest electronic mail networks in the world, for instance, but because of incompatibilities in its workstation, midrange, and mainframe products, the company lacks a consistent technical architecture across the business. It is trying to redress the position by basing its future internal systems on two main architectures, SAA and AIX, that it says it will engineer to work together. For most businesses, defining a technical architecture for its own use is a difficult, but not impossible, challenge. We provide guidelines in the next Foundation Report to be published.

Report conclusion

Process management is a way of organising the business to break free from the traditional functional approach that has been developed over many decades. By cutting across functional divisions, process management promises both to make businesses more responsive and to improve service and quality. It also brings major new management challenges. It implies team working, with individual team members undertaking a wider role than before, and empowered with greater discretion. Information systems have a crucial role to play because they provide the means by which the idea of process management can be made to work in the most effective way. The promise of information technology — and perhaps its ultimate impact in the 1990s — is to make process working a practical business proposition.

The systems department will not shape the organisation in the 1990s, as some theorists have predicted; that will continue to be the job of the senior executives steering the business. As the custodians of the information strategy, however, the systems department will have a critical role to play in guiding the activities of senior business executives. In a real sense, the availability of appropriate systems support will determine a business's ability to transform itself to one based on process management. Open standards will help, but will not be defined and implemented easily or quickly

Proprietary solutions offer an alternative, but no less risky, path

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