

Organising the Systems
Development Department

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PEP Paper 11, August 1989



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by Daphne Leggetter

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Daphne Leggetter is a senior consultant with Butler Cox in London, with 20 years of experience in strategic systems planning, software project management, and the design of business systems. She has a special interest in the staffing and organisational implications of systems developments, and was part of the team that researched and wrote the Butler Cox Foundation Report, *Staffing the Systems Function*.

During her time with Butler Cox, she has also carried out a wide range of consulting assignments. Recent projects in which she has been involved include formulation of a long-term organisational and IT-related strategy for a large pharmaceutical research group, development of an approach to systems planning for a major service organisation, and assessment of the feasibility of the UK Government Training Agency's 'model office'.

Prior to joining Butler Cox, Daphne Leggetter spent four years as a consultant with Grant Thornton, specialising in systems planning assignments and systems requirements studies. Earlier, she was a project manager for BUPA, responsible for developing and implementing a marketing information database. Her early career was in the systems area in local government.

She has a Bachelor of Arts degree in economics and economic history, and is the co-author of *Managing your computing — a practical handbook*, published in 1988 by Blackwell Scientific.

BUTLER COX
REP

Organising the Systems Development Department

REP Paper 11, August 1980
by Stephen J. Roberts

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The complexity of organisation

Systems development managers are having to contend with an enormous range of problems in running their departments to provide a service to the businesses that they support. Very often, they have concluded that these problems are caused, at least in part, by the way in which the systems department is organised, and that changing the organisational structure will therefore go some way towards resolving them. Of the PEP members we contacted during the research for this paper, most had re-organised within the last two years, and some were in a state of transition. The nature of the organisational changes being initiated varies from company to company, but it is widely assumed that the design of an organisation will have an effect on its performance.

Organisational design is about more than structural form

Organisational design, however, is not just about structural form. The behaviour of individuals in an organisation, and therefore their performance, is influenced by a variety of other factors. These range from the regard in which they are held by business management, whose views may be coloured by past failures, to the level of freedom and amount of challenge accorded to individuals in their jobs. Above all, the personality and skills of the staff involved will affect the way they perform. While personality can overcome organisational constraints, a perfect structure will not guarantee results if there are deep-seated personality conflicts.

Organisational structures must be designed to achieve efficiency and effectiveness in systems development

It follows that there is no 'right' organisation structure for systems development that is universally applicable. The one that suits a particular systems development department will depend on the characteristics of the host business, the technological environment, and the 'internal' systems environment. As the relative importance of these factors changes over time, the organisation of systems development will need to respond, to strike a balance between the prevailing conditions. The objective for any systems development department will be to achieve an organisation that is both effective (doing the right things), and efficient (doing it right). Systems managers have a responsibility to learn how to recognise problems that might have an organisational cause so that they can take action to maintain the service that the systems function must provide to a more and more demanding and cost-conscious set of customers.

THERE ARE MANY PRESSURES TO CHANGE THE SYSTEMS DEVELOPMENT ORGANISATION

The pressures for changing the organisation of the systems development department are numerous. The following is a small sample of the problems quoted by PEP members:

Chapter 1 The complexity of organisation

- A public utility in the United Kingdom had a policy of distributed but uncoordinated computing. This meant that development staff were scattered throughout the user departments, “subject to the whims of their departmental barons, and in danger of losing any sense of professional identity”.
- The development manager of a retail store told us that he thought his organisation structure was “slightly odd, owing to history and to personalities”.
- In the Netherlands, a systems manager at Ahold, a major supermarket chain, explained that users have problems “knowing where requests for development or automation solutions should be channelled”.
- Several systems development managers told us that their main problems stemmed from the fact that their departments had a low ‘presence’ in the business and were often regarded as being of peripheral importance.

None of these problems is unique to these PEP members. They highlight the complicated array of factors with which systems development managers have to contend when considering how to organise their departments. Figure 1.1 lists the most common problems mentioned by PEP members during our research, and Figure 1.2 shows the most frequently mentioned types of re-organisation undertaken in response to these problems. Clearly, there is a trend towards aligning systems development more closely with business divisions, and also towards widening the scope of individual jobs. The move to recentralise has usually been in response to the increased staff turnover and loss of professional identity that frequently occur when staff are devolved to the business units.

It is also clear, however, that there is no consensus of opinion about the most effective way to organise systems development. For example, some members have decreased the scope of jobs so that they can direct their training effort more effectively. Some have increased their dependence on contractors, but others have deliberately dispensed with contractors. While the different responses listed in Figure 1.2 reflect the different circumstances applying to each PEP member, the pressures for change, in all businesses, arise from two distinct sources — changes in the business environment and technical advances.

CHANGES IN THE BUSINESS ENVIRONMENT

Today, more businesses are managed in a more decentralised way than was the case 10 years ago. These changes have been brought about by increasing competitive pressures, which require businesses to be more flexible in operation, and more responsive to the customer. This trend is noticeable both in the private and in the public sectors.

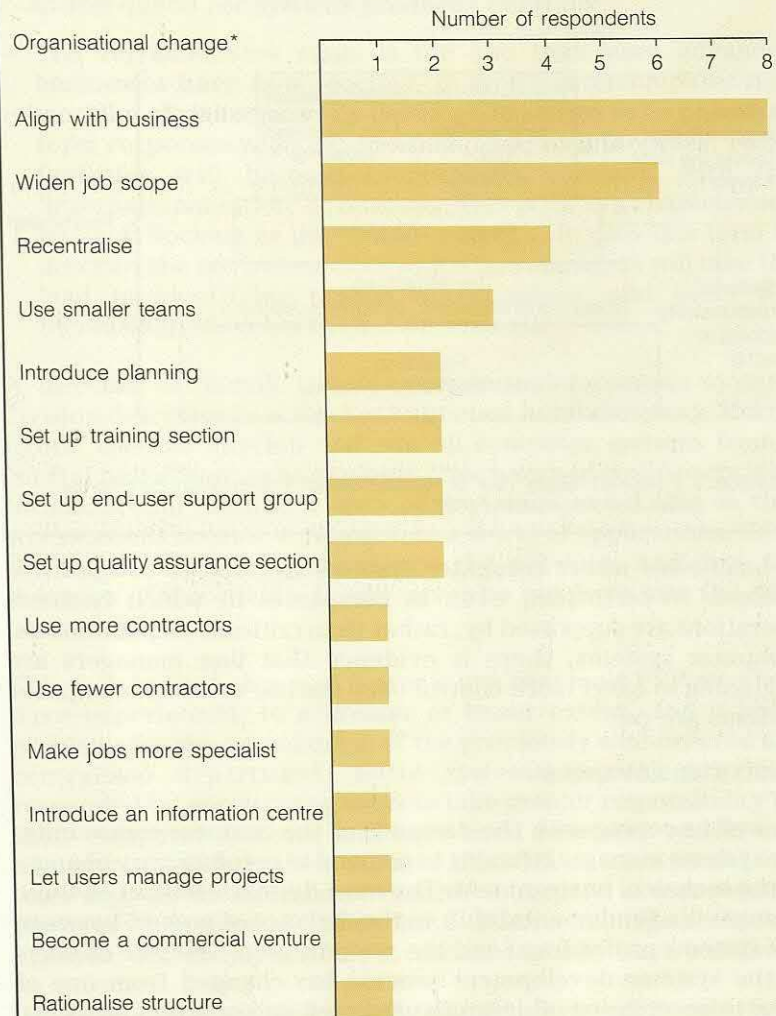
As a consequence, computer systems are increasingly being used by businesses to help them remain competitive. They do this either by increasing operational efficiency, or by differentiating products and services to give the business a competitive advantage. In some cases, such as in major banks, the provision of some financial services would not be possible without the support of computer systems. Not surprisingly, line managers

Figure 1.1 PEP members quoted many problems deriving from the nature of their organisation

Failed attempts to decentralise.
Low ‘presence’ in the business.
Priorities set too low down.
No overall systems planning.
User confusion over communications.
Low productivity.
Rising development costs.
High staff turnover.
Lack of career structure.
Development of poor-quality systems by users.

Computer systems are increasingly being used by businesses to help them remain competitive

Figure 1.2 PEP members have introduced a variety of organisational changes in response to their problems



*Some members have introduced more than one change

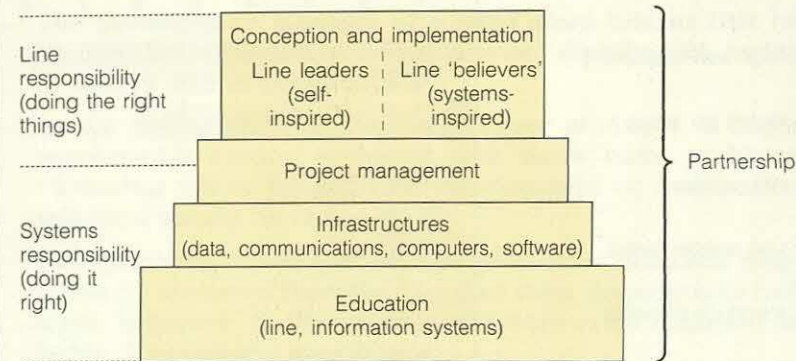
(Source: Butler Cox survey of PEP members)

are pressing for more control of systems development, and systems departments have responded by decentralising some resources. These changes have not always been successful, and they have often resulted in increased turnover.

However, Jack Rockart, director of the Center for Information Systems Research at the Sloan School of Management, thinks that the trend for line managers to take the initiative in the use of information systems will continue. He foresees that a systems-management structure, like that illustrated overleaf in Figure 1.3, will develop to support this new role in the 1990s. In this model, line managers are responsible for identifying the systems that are needed to help the business (sometimes with a little help from systems professionals), and the systems department's job is to provide the technical support. This structure is most evident

There is a trend for line managers to take the lead in the use of information systems

Figure 1.3 A new systems-management structure will evolve to support the new role of line managers



(Source: J F Rockart. Study Tour of Massachusetts: Presentation Summaries. Butler Cox Foundation, 1987.)

in businesses where computer systems are vital to competitive success. Nevertheless, even in companies in which business operations are supported by, rather than critically dependent on, computer systems, there is evidence that line managers are beginning to exert more control over the use to which computer systems are put.

TECHNICAL ADVANCES

As well as coping with the demands of the business community, the systems manager is having to respond to revolutionary changes in the technical environment. The most dramatic impact of these changes is a fundamental shift in the 'balance of power' between the systems professional and the systems user. The role of users in the systems development process has changed from one of passive acceptance of centrally designed and operated systems, to active experimentation in designing their own systems. This change has occurred as the use of computer systems has evolved through four stages, which we have called efficiency, effectiveness, competitiveness, and infrastructure. The characteristics of each stage are described below:

- The *efficiency* stage was dominated by mainframes running systems designed to speed up clerical tasks. The role of users was confined to preparing data and learning to use the printed outputs.
- The *effectiveness* stage saw the introduction of minicomputers and internal networking, which gave users direct access to information held on computers. This increased the potential of computer systems to enhance the scope of jobs and increase productivity. User input was increasingly sought to define requirements and to ensure that systems were introduced effectively.
- The *competitiveness* stage was made possible by developments in telecommunications, and the advent of personal computers, commercial software packages, and fourth-generation

The respective roles of systems professionals and systems users are changing

languages. The first enabled customers and suppliers to be linked directly with businesses; the second gives users the ability to build systems for themselves, without having to wait in the queue for systems produced centrally.

- The *infrastructure* stage is the one that more advanced businesses have now reached, in which intercomputer networking allows separately developed systems to be linked, to form corporate-wide information-processing facilities. These facilities will become increasingly common with the 'internationalisation' of business. This is the era characterised by Jack Rockart as the 'wired society'. He uses this term to describe the environment in which line managers will take the lead in identifying system opportunities, and users will increasingly develop their own systems.

A director of Merrill Lynch's corporate information systems division describes how this has happened in his company. Merrill Lynch used to develop and run all computer systems from a central unit. Then, as he explains, "we began to equip users with terminals and created a web of SNA nets and LANs so that workstations became windows into a world of applications. Now, the information has escaped into the network, and onto the desktops of the clients. It will never be put back into the data center again."

***The changing roles pose problems
for the organisation of the
systems department***

This shift in the balance of power is one that most PEP members have experienced, to a greater or lesser extent, and it poses problems for the organisation of the previously well-ordered and centralised department. Some systems departments have responded by encouraging users to take greater responsibility for their computer systems, and have sited resources within user departments to help them achieve this. Others have established 'user support' or 'information centres' to respond to user requests for help when needed. Others have taken a 'damage limitation' attitude, and simply sorted out mistakes as they have occurred.

The problems associated with handling this change in roles have received a lot of attention from management and organisational specialists. Among these people, there is a growing consensus that each new technology that arises poses similar management problems. This creates an insight into how 'end user' computing might be organised and managed.

EACH NEW TECHNOLOGY HAS SIMILAR IMPLICATIONS FOR MANAGEMENT

***There are four distinct stages
in the evolution of each
technology***

Probably, all PEP members are familiar with Nolan and Gibson's *Managing the four stages of EDP growth*, published in the Harvard Business Review in 1974. In this article, they introduced their 'stage' theory, which implied that there were four distinct stages of growth, and that learning how to use the technology was facilitated by different styles of management in each of these phases. More recently, John Henderson and Michael Treacy of the Massachusetts Institute of Technology, in their 1986 paper, *Managing end-user computing for competitive advantage*, suggested that the pattern of assimilation and growth described by Nolan and Gibson is repeated for each distinct new technology.

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This insight has been validated by research carried out in 1987 in the United Kingdom by the Oxford Institute of Information Management. Figure 1.4 shows the characteristics of three new technologies in each of the four stages — initiation, expansion, formalisation, and maturity — identified by this research.

Figure 1.4 Each new technology goes through four stages of assimilation

Example of technology	Growth stage			
	1 Initiation	2 Expansion	3 Formalisation	4 Maturity
Business transaction processing	Cost reduction Accounting applications	Business transaction processing extends to most major functions	Emphasis on efficient and professional implementation and operation Formal measurement and control processes Slow application growth	All important areas of business activity are supported by systems that operate from an integrated database structure, which can also support management decision-making
End-user computing	Few users Focus on functional planning	Users in many departments/functional areas Central support structure	Audit of asset base Implementation of procedures that focus on availability, integrity, and security of data and tools	Workstation concept effected within integrated infrastructure, communications, and database
Office automation	Word processing facilities introduced	Electronic mail plus — for example, diaries, filing, and retrieving	Integration of office automation with other systems services Emphasis on efficiency and professionalism Formal measurement and control procedures	New office configurations

(Source: Complex organizations and the information systems function. Oxford Institute of Information Management, 1987)

According to Henderson and Treacy, there are important implications for the systems development manager trying to cope with the organisational aspects of these technologies. They describe the problem as 'IS managers being called upon to strike a balance between end-user demands and an appropriate strategy that is somewhere between tight control and *laissez-faire*'. They explain that, while control by the systems department of end-user computing and any other new technology may focus user resources

**Different styles of management
are appropriate for
each stage**

on building systems in the areas most critical to the business, it can also restrict learning and innovation by the users, thereby creating general dissatisfaction.

During the initiation and expansion stages, the emphasis should therefore be on organisational support and education to generate enthusiasm, with the user being free to experiment to produce *effective* systems that support the business. These will not necessarily be technically elegant systems, but they will reflect the users' real needs, and so increase their satisfaction in these systems. The formalisation stage is the appropriate time for the systems department to start imposing some control, and to begin to concern itself with technological issues.

Henderson and Treacy concluded that some systems managers try to impose control too early, with the result that they lose credibility, and are ultimately bypassed by users. The need for control will arise because of the increasing demand from users to share data and programs. The technical expertise of the systems department will be needed to create effective standards for data security, data integrity, and compatibility. The maturity stage will be the appropriate time to consider *efficiency* and to manage the spread of the technology throughout the company, within the integrated infrastructure developed in the previous stage.

Most systems managers are having to cope with multiple technologies at different stages of maturity. Batch processing, and sometimes online processing, have typically reached the maturity stage. Office automation is commonly at the expansion stage, while end-user computing hovers between expansion and formalisation. These different stages of maturity increase the complexity of choosing an organisation structure for systems development, and highlight the need to modify the structure as circumstances change.

PURPOSE AND STRUCTURE OF THE PAPER

In this paper, we have drawn on the experience of the systems development departments that assisted in the research, with a view to providing insights into best practice in systems development organisation. Individual systems development managers will need to review their own particular circumstances to assess the relevance to their organisation of each particular recommendation.

In Chapter 2, we describe how systems development should be organised to be effective. Different businesses have different management styles and structures. There are also different styles of organisation for the systems development department, all of which are in evidence among PEP members, but some work better or less well than others in different styles of business. We explain the two most important objectives for a systems development department seeking to serve the business — to align the structure with the management structure of the business, and to devolve to the user the amount of responsibility for providing systems that is consistent with the types of systems being developed.

In Chapter 3, we explain how to achieve greater overall efficiency. The internal structure of the systems development department is becoming more complex as the service is distributed throughout the company, but the overall pattern is one of increasing customer

Chapter 1 The complexity of organisation

alignment to serve the business units. Most PEP members, however, still have large central departments coping with new technologies, and maintaining a variety of existing systems dispersed over different computers. This has given rise to different organisational arrangements, such as grouping by technology (for example, an IBM group and a Digital group), or by specialisation (with programmers, analysts, and business analysts forming separate teams), or by application type, development method, and so on.

We have found that three issues are particularly important to achieving efficiency — reducing the number of management layers, adopting a functional grouping for jobs that is closely aligned to the role of systems development, and maximising the contribution of the individual. The latter implies actively pursuing a job-enlargement policy to increase the individual's skills, introducing job rotation, paying particular attention to career structures, and ensuring that jobs are fitted to people rather than trying to recruit people who match a rigid job specification. All these actions are designed to build greater flexibility into the structure of the development service and to make it more responsive to the needs of the business.

Constant re-organisation, however, is disruptive, costly, and potentially demoralising. It also diverts attention from the task of building a relationship with the user, and can therefore be counter-productive. In Chapter 4, we describe how to recognise problems that are likely to have an organisational cause and suggest an approach to managing change to help overcome them. It is crucial to recognise the political nature of organisation and to take a participative approach. Everyone involved should be informed, consulted, and 'sold' the benefits before the process of change is started. The use of third parties often helps to defuse potential problems, because they can be seen to be more impartial than resident managers.

*Re-organisation involves change,
and change must be managed*

RESEARCH SOURCES

We began by analysing the PEP database to identify members with a range of different Productivity Indexes, and selected several for detailed personal interviews. Our aim was to see if we could identify a relationship between the Productivity Index and the structure of the systems department. The interviews were chosen to represent as wide a range of industry sectors as possible. Interestingly, we could find no common organisational characteristics among systems departments with a high Productivity Index, or among those with a lower rating. The interviews, however, provided many useful insights into PEP members' recent organisational changes, and the lessons to be learned from these.

We supplemented the interviews with a telephone survey of PEP members to identify recent organisational changes that had been made, and their causes and consequences. Quite a few changes had been made too recently for the impact to be measured, however. We also sought specialist opinions, derived from literature reviews, a conference, and personal interviews.

Organising systems development for effectiveness

To be effective, systems development must be closely aligned with business needs. Organising the systems development department to achieve this is a complex matter, but two factors are particularly important and therefore merit special attention. One is the need to take account of the management style of the business as a whole. The other is the extent to which it is appropriate for some systems development responsibilities to be devolved formally to the users.

ALIGN SYSTEMS DEVELOPMENT WITH THE BUSINESS

The overall management structure of the systems development department is the first and most important area of organisational choice for systems development managers. Over the past 10 years, there has been much debate about the respective merits of centralised, decentralised, or distributed arrangements. Since the ability of a business unit to pay for systems development is closely linked with the budgetary authority given to it by head office, there is a compelling reason to match the management style of systems development to that of the business as a whole.

For a complex business, there are four broad management styles

In a recent Butler Cox Foundation Directors' Briefing, *Managing Information Systems in a Decentralised Business*, we categorised the range of possible management styles for a complex group (that is, one that has multiple business units), into four broad types, each identified by the degree to which head office gets involved in formulating business-unit strategies:

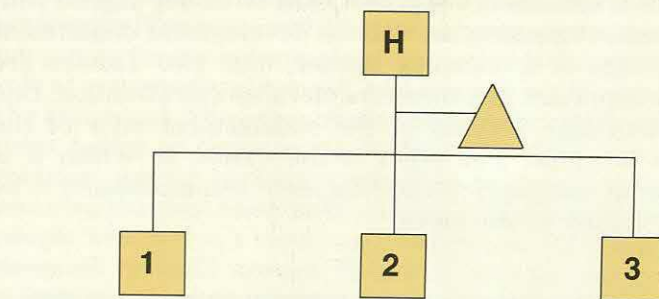
- The *fully integrated* style, in which head office has total control over functional divisions.
- The *bear-hug* style, where head office exerts close control over the strategy-setting of the business-unit managers, to ensure that they can share common functions such as manufacturing and distribution.
- The *helping-hand* style, in which head office encourages the business-unit managers to devise their own plans and strategies, but monitors and reviews them carefully to ensure that they fit together.
- The *arm's-length* style, in which responsibility for strategy and operations is fully devolved to the business-unit managers. This style is usually found in highly diversified groups, such as conglomerates, where there is little or no common ground between business units.

There are four main management styles for systems development, too

Similarly, there are four main styles for managing the systems development department:

- The *centralised* style, in which a unified department reports via the information technology director to corporate management. The department liaises with business units through formal user contacts located in the departments, or as one PEP member describes them, “departmental computer liaison officers” (see Figure 2.1).

Figure 2.1 With a centralised management style, a unified systems development function reports to corporate management

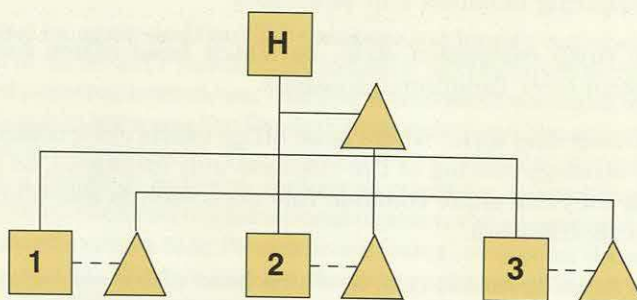


Key:

- H Head office
- Systems development
- n Business unit

- The *coordinating* style, in which the central unit devolves some of its development responsibilities and resources to the business units, but maintains a firm grip on systems policy and strategy across the organisation (see Figure 2.2).

Figure 2.2 With a coordinating management style, some development responsibilities and resources are devolved to the business units



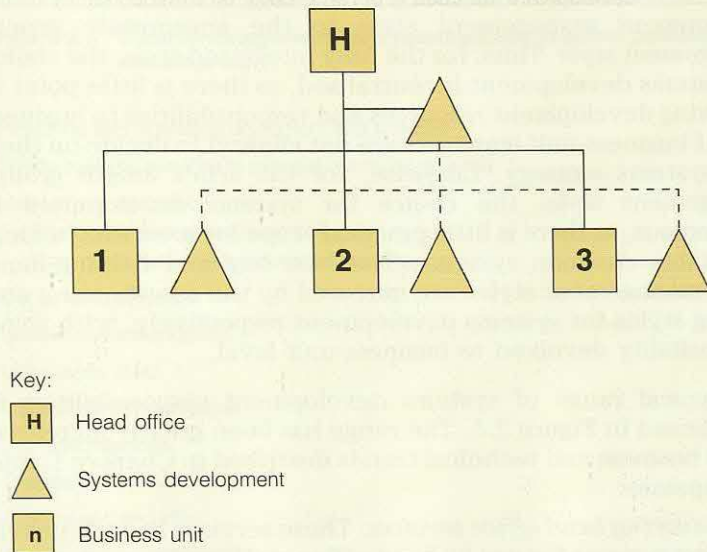
Key:

- H Head office
- Systems development
- n Business unit

- The *guiding* style, with each business unit containing and largely controlling its own systems development resource,

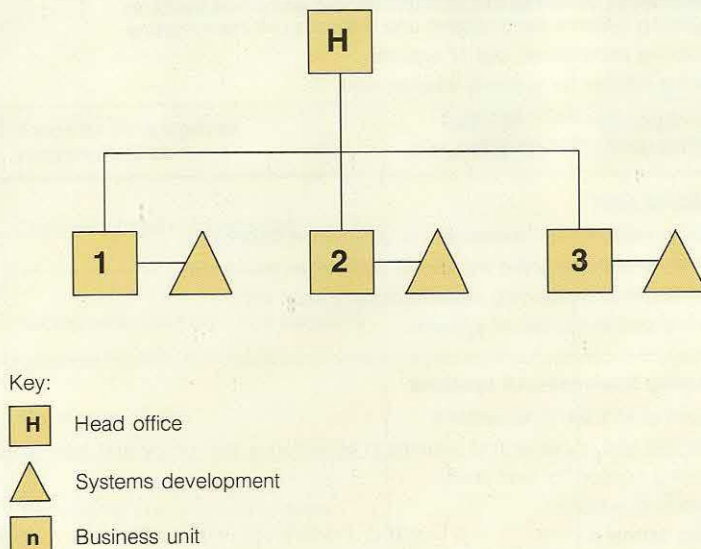
but with a central unit reporting via the information technology director to corporate management, and defining aspects of policy, such as a common systems architecture, across the organisation (see Figure 2.3).

Figure 2.3 With a guiding style of management, each business unit controls its own systems development resource and a central unit reports to corporate management



- The *autonomous* style, with each business unit containing its own development resources, which are entirely under its own control. There is no central systems development unit, except perhaps for the support of corporate head office systems. Corporate management reviews the units' capital and budget submissions for systems development work only to the extent required by general financial planning and control procedures (see Figure 2.4).

Figure 2.4 With an autonomous management style, each business unit has its own development resources under its own control



Each of these four styles of organisation for systems development can exist independently of the organisation of the rest of the information systems function. In the 'guiding' style, for example, the operations service is generally more centralised than systems development because of the need to provide corporate mainframe services.

To prevent misalignments between systems development and the business, it seems obvious that it is necessary to match the systems development management style to the appropriate group-management style. Thus, for the fully integrated style, the choice for systems development is centralised, as there is little point in devolving development resources and responsibilities to business units if business-unit managers are not allowed to decide on their own systems strategy. Likewise, for the arm's length group-management style, the choice for systems development is autonomous, as there is little practical scope for producing widely acceptable common systems. The bear-hug and helping-hand group-management styles are mirrored by the coordinating and guiding styles for systems development respectively, with some responsibility devolved to business-unit level.

The typical range of systems development responsibilities is summarised in Figure 2.5. The range has been greatly increased by the business and technical trends described in Chapter 1, and encompasses:

- *Delivering head office services:* These services include developing systems for use by head office staff, and assessing how new developments in technology could benefit the business.

There are compelling reasons to match the management styles of systems development and the business as a whole

Figure 2.5 The range of systems development responsibilities has become quite extensive

Delivering head office services

Providing systems for head office.
Making central bureau services available.
Watching trends in information technology.

Setting policy, strategy, and standards

Integrating systems development and business-unit planning.
Monitoring competitors' use of systems.
Defining policies for systems development.
Maintaining a systems strategy.
Auditing quality and security.

Developing staff

Building management awareness of information technology.
Promoting and catalysing the use of information technology.
Recruiting and developing systems development staff.
Training staff in the use of systems.

Developing business-unit systems

Budgeting and planning systems.
Designing and implementing systems in accordance with policy and standards.
Providing support for end users.
Maintaining systems.
Buying software.

- *Setting strategy, policy, and standards*: Devolving responsibilities to business units highlights the importance of maintaining central management responsibility for defining a company-wide systems architecture and a set of standards to ensure that information can be exchanged throughout the group. This gives rise to the need for policies, such as those shown in Figure 2.6, and for central management responsibility and authority to ensure that they are applied.

Figure 2.6 Central management has a responsibility to define policies in certain areas

Procuring and operating equipment and software.
 Selling systems services to external clients for revenue.
 Maintaining compatibility in:
 — Equipment and software portfolio.
 — Data interchange with corporate systems.
 Document standards.
 Development standards.
 Languages used.
 Data dictionary standards.
 Job specifications.
 Disaster recovery.
 Privacy and security.
 Quality and systems audit.

- *Developing staff*: This includes training staff in the use of systems, and recruiting and developing systems development staff.
- *Developing and operating business-unit systems*: These are the systems required by the business units for their day-to-day operations.

For the coordinating style of systems development management, responsibilities are devolved to business units as shown in Figure 2.7.

Figure 2.7 With the coordinating style of management, a central function is retained and some responsibilities are devolved to business units

Systems development responsibilities	Central responsibility	Business-unit responsibility
Delivering head office services		
Setting policy, strategy, and standards		
Developing staff		
Developing business-unit systems		

A central function is retained to deliver head office services and take the lead in setting strategy, policy, and standards, and in developing staff. For the guiding style of management, responsibilities are devolved as shown in Figure 2.8, with the business units taking sole responsibility for delivering and operating business-unit systems, and also taking the lead in setting strategy, policy, and standards, and in developing staff.

Figure 2.8 With the guiding style of management, business units take sole responsibility for delivering and operating business-unit systems

Systems development responsibilities	Central responsibility	Business-unit responsibility
Delivering head office services		
Setting policy, strategy, and standards		
Developing staff		
Developing business-unit systems		

In practice, however, there are powerful reasons for adopting a more centralised style of systems development management than is suggested by the group-management style. The first is *the need to provide flexibility* for the group's future organisational choices. Groups with 'synergistic' divisions, such as multiple retailers, often find a need for cooperation and shared approaches to business ventures, such as the use of common credit-card systems. This type of group often restructures in such a way that, for instance, all manufacturing functions or all marketing functions are put under one line manager. Autonomous systems development, with mutually incompatible hardware or software, hampers the process of re-aligning the business units.

The second is *the trend to integrate systems*, which involves the design of corporate databases to support a variety of business and executive-support applications. One systems manager described to us the importance of allowing for future integration. He explained, "We had nine different computer suppliers, 12 different operating systems, and 16 different programming languages. We had taken ourselves up a cul-de-sac. Computing had become the fiefdom of departmental barons. There was information everywhere but no-one from other departments could access it."

The third reason for adopting a more centralised organisational style is *the scarcity of skilled resources*, which makes it extremely unlikely that smaller units (those employing fewer than, say, 20 development staff) could either afford or attract new recruits. The problem is that in an industry that is growing at a consistently

In practice, management of systems development can justifiably be more centralised than group management because of the need for flexibility in organisational choice, . . .

. . . the trend towards systems integration, . . .

. . . the scarcity of skilled resources, . . .

high rate, and where the speed of technological change is unprecedented, there is a general shortage of certain skills. While some traditional technical skills, such as operational skills, are less in demand than they have been, there is a new demand for specialist technical skills, such as database skills, specialist language skills, and those required to handle data communications in a multivendor environment. There is also a growing need for a 'hybrid' type of person with an equal appreciation of the business environment and technology, who can contribute to the development of business-unit systems. This shortage of skills is compounded by impending demographic changes, which will tend to make the problem even more acute in the future.

... and the need to provide suitable career structures

A more centralised organisational style will also make it easier to provide *suitable career structures* for systems development staff. Efforts by PEP members to decentralise resources to business units have often resulted in an increased rate of staff turnover. Research conducted by Butler Cox's representative in Australia confirms that this is a common response. Staff turnover does tend to increase immediately after decentralisation, as a result of the uncertainty and confusion that re-organisation creates. It will tend to continue, in the longer term, if staff perceive their career opportunities to be limited to the decentralised business unit in which they work. Career planning needs to be centrally orchestrated so that staff can move freely around the organisation, between business units, or between business units and the centre.

For these reasons, it is sensible to adopt a more centralised organisational approach to systems development than the one that is implied by the group-management style. Maintaining a common systems infrastructure, for example, and defining standards for data interchange with corporate systems provides the flexibility to integrate systems more easily in the future if business needs change, or if the group re-organises.

CLARIFY THE RESPONSIBILITIES OF USERS

As well as the centralisation versus decentralisation issue, there is a second balance to be achieved in the allocation of systems development responsibilities: the balance between 'users' and 'specialists'. Apart from some highly publicised incidents of line managers taking the initiative and pushing through some successful competitive-advantage systems, this issue still remains largely unresolved.

Some PEP members have suggested that their users are not yet ready or willing to take on much responsibility for systems development. Others pursue the 'damage limitation' approach that we mentioned in Chapter 1. However, unless the re-alignment of responsibilities between the systems professional and the user has been clearly defined and agreed, the systems development function will not be able to support the business community as it should. Users will then continue to build their own undocumented, and probably unmaintainable, systems.

The devolution of control to users is, in fact, already happening. It began with the proliferation of personal computers, and continued with the move towards departmental computing in the mid-1980s. This devolution must be managed in such a way that order is

***A balance must be struck between
users and specialists ...***

***... otherwise, systems develop-
ment will not be able to support
the business properly***

maintained without initiative being stifled. A useful way of formalising responsibilities is with reference to the three levels of applications found in most organisations. These can be described as core systems, non-core systems, and personal systems.

CORE SYSTEMS

These are the applications that are essential to the day-to-day operation of the business. In general, they maintain and update the common corporate databases, and often provide a base for subsequent applications to use. Clearly, if these systems, which exploit database technology and commonly process high volumes of transactions, are to be developed efficiently, skilled technicians will be needed. The systems they design must be built in accordance with central policy guidelines to ensure that a coherent software infrastructure is maintained. It is appropriate, however, for senior management to take the lead in deciding what systems should be developed, and also in managing their development and implementation. These managers should be able to see the relationship between computer systems and business goals and to work out how a computer application could effectively automate a particular business function. Responsibility for innovation is thereby shared with senior managers and is no longer the sole responsibility of the systems department.

For core systems, responsibility for innovation is shared between line managers and the systems department

NON-CORE SYSTEMS

These are the systems that are used by a business unit or a department within a business unit. Their purpose is to achieve the unique objectives of that business unit, and they do not normally affect the day-to-day operations of other business units. It is appropriate, therefore, that business-unit managers have control over what systems are implemented, but because it is possible that the data and programs created will be shared by other departments in the future, the systems should conform to the company-wide policies and guidelines laid down by central systems development management.

Users should be encouraged to experiment with non-core systems

Development of these applications is frequently undertaken by the users themselves, who should be encouraged to experiment with different designs and to explore the possible applications of the newer technologies, such as end-user computing and office automation. Three separate studies conducted by the Rand Corporation in 1988 confirm the wisdom of this approach. All these studies concentrated on the effective introduction of end-user computing, and found that success in this area is closely related to the amount of control exercised by users. This is particularly significant for business-critical systems, for which speed of development and close fit to requirements, rather than technical efficiency, are paramount. The role of the systems specialist in these developments is to provide education, support, and guidance.

PERSONAL SYSTEMS

These are not application systems in the usual sense of the word, but a variety of tools and techniques that enable users to set up their own systems. They include the microcomputer-based systems developed using spreadsheets, word processors, database managers, and so on. These systems are firmly in the control of the users, and the role of the systems specialist is limited to providing them

Personal systems are firmly in the hands of users

The burden of providing all types of systems for the whole business is removed from the systems department

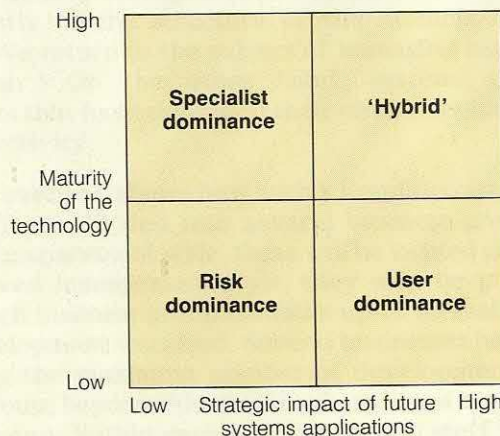
with company-approved packages and training in their use. These systems, however, frequently become the business-unit (or non-core) systems of tomorrow, with subsequent access to the corporate databases being requested to enable users to manipulate the information locally. It is important, therefore, that these users should adhere to conventions established by the systems development department for the company as a whole. One PEP member has made it a rule, for example, that users can choose which personal computer suppliers they use, but only standard products will be connected to the corporate network.

With the division of responsibilities described above, the burden of providing computer systems for the entire business is removed from the systems development department. Most business-unit projects can be developed by users, while the systems department concentrates on those that are shared by several business units. Responsibility and accountability for performance are shifted to the users for all types of systems development. This places the onus on business management to become educated in the use, control, and delivery of computer systems within their organisation, and to take time to understand the true scope of a system project and to devote adequate resources to its completion.

The Oxford Institute of Information Management has recently completed a study of complex organisations and of the organisation of the information systems function. One result of this study is a matrix, depicted in Figure 2.9, that can be used to define the respective responsibilities of users and systems development departments. The matrix takes into account the strategic importance to the group of future systems developments and the maturity of the technology required for these applications (not the stage of assimilation reached by the particular organisation):

- If the strategic impact of applications is assessed as 'low', and the technology required as 'mature', considerations of operational efficiency are paramount and specialists should be given responsibility for them, although a user manager will be

Figure 2.9 The responsibilities of the systems department and users may be allocated with reference to a matrix

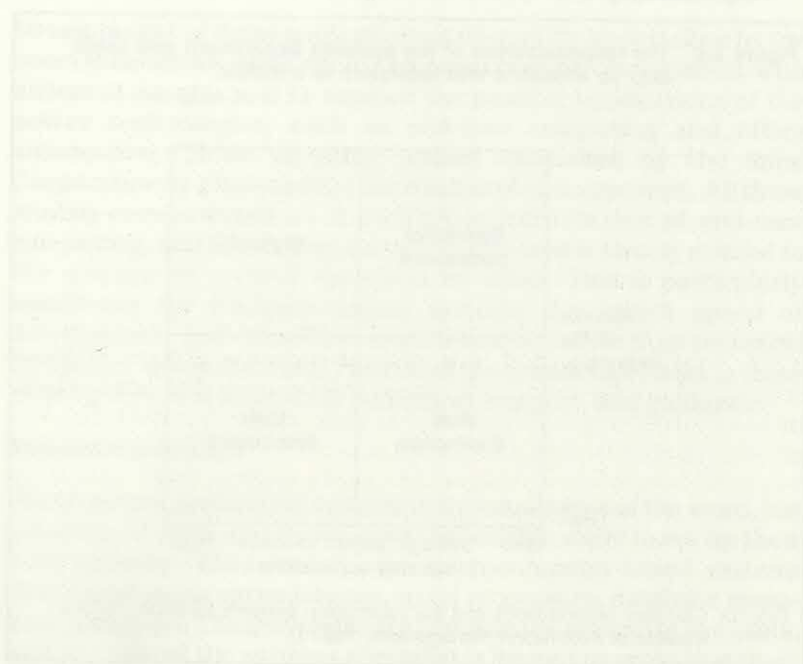


(Source: Complex organizations and the information systems function. Oxford Institute of Information Management, 1987.)

ultimately accountable. Such applications might include support systems, like payroll and general ledger.

- If the strategic impact is low, but new technology is required, the technical risk is high and the potential benefit to the business very limited. The application should probably not be developed.
- The combination of high perceived strategic impact and relatively mature technology means that the users need to be in real control of the systems strategy (the 'what'), while specialists control the 'how' of systems development. These could be core or non-core applications.
- Applications that have a high strategic impact and use new, immature technology should be entirely within the users' control, with 'an unabashed concentration on effectiveness'. These are the non-core and personal systems developed using end-user computing and office technology.

How this re-alignment of responsibilities will affect the 'internal' organisation of the systems development department is described in Chapter 3.



Organising systems development for efficiency

*Those providing the service
should be given greater
autonomy*

The growing reliance of businesses on computer systems has resulted in much greater attention being paid to the cost of the systems development service, and a drive by line managers to obtain 'value for money'. This puts greater demands on the systems development department to meet budgets in terms of cost and time, and to produce high-quality systems.

The key to meeting these demands is to allow greater autonomy to the people who are providing a service to line management. This involves 'flattening' the management structure, and for the centralised systems development management style, breaking up large departments into smaller, autonomous units. Within these units, jobs should be regrouped to reflect the new alignment of responsibilities described in Chapter 2. The new structure should be underpinned by introducing a variety of job-enhancing measures. Taken together, these changes will lead to a more motivated workforce, which is the biggest single contributor to efficiency.

*There is a trend for large
businesses to shed some
of their management
layers*

SIMPLIFY THE HIERARCHY

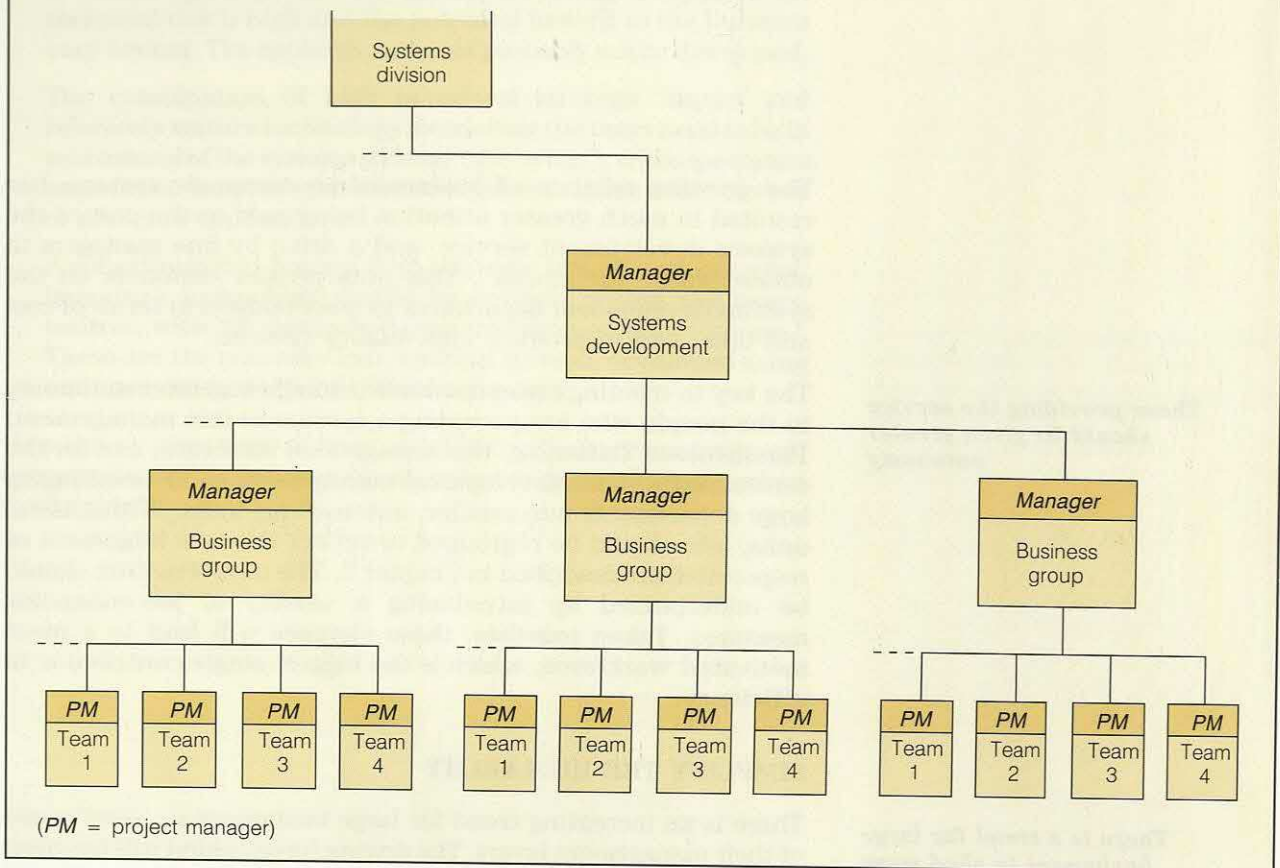
There is an increasing trend for large businesses to 'shed' some of their management layers. The driving force behind this has been the need to improve staff communications, both horizontally and vertically, in order to be able to respond more quickly in a competitive marketplace. The result within the 'flatter' organisation has been improved morale and staff productivity.

In spite of this, it is not uncommon for systems development departments to introduce more and more layers of management in the belief that this creates a career structure. In fact, career advancement is a management issue and should be handled independently of the structure of the systems development function. (We return to the subject of managing careers later in this chapter.) On the other hand, systems development departments that have simplified their structures have improved their productivity.

*In a simplified structure, staff
are divided into business
groups of up to 50
people*

Figure 3.1, overleaf, shows how such a simplified structure might work. Staff are divided into several business groups. With a centralised management style, these will be located at head office. In a devolved management style, they may be physically dispersed. Each business group contains up to 50 staff, depending on the development workload. Several businesses have identified 50 as being the maximum number of development staff for a business group; beyond this, staff begin to lose a sense of identity with the group. Within each business group, staff are allocated to work on projects under a project manager, depending on their skills, availability, preferences, and so on. Each team is kept to a maximum of six. In PEP Paper 7, we identified five or six as

Figure 3.1 An efficient organisation structure for systems development has no more than three reporting layers



the optimum number in a team to achieve maximum productivity, and an encouraging number of organisations are now adopting this advice.

Responsibility for developing systems within the policy and strategy guidelines laid down by the central systems department is devolved to the business-group managers. The role of a business-group manager is to liaise with line managers and to agree on the scope and type of each systems development service needed by the business unit. In the past, the systems development department has been a monopoly supplier of services handed out to users. This is now changing, both because users are taking control of some of their own systems developments, and also because competitive pressures on users are encouraging them to look for alternative suppliers. As a result, the systems development department now has to adopt a more marketing-oriented approach to increase its credibility with its users, and to retain its status as the main supplier of development services. The role of the business-group manager is therefore a difficult one. It requires a person able to deal effectively with senior business managers, knowledgeable enough about technical matters to be able to guide approaches to development, and a diplomatic yet forceful personality. The advantage to line managers is that they have a single point of contact for all systems development ideas and problems.

The systems development department now has to adopt a more marketing-oriented approach

The situation depicted in Figure 3.1 represents the optimum structure. Factors such as the overall size of the systems development function, or geographical dispersion, may prompt a need for additional management layers. The objective for systems development managers wanting to improve the efficiency of their departments, however, should be to aim for a flatter overall structure.

An example of a company that has successfully done exactly this is British Airways. This major airline has deployed 750 development staff into business groups of between 20 and 120 staff, each one divided into four to six project teams. Motivation and productivity have increased enormously. The interesting point about this re-organisation is that while it is based on lateral, rather than vertical expansion, the span of control of each layer of management — that is, the number of staff under each manager's direct control — has been kept manageable, by delegating more authority and responsibility to business-group and team-level management.

In the simplified structure, business groups must be organised by function

GROUP THE RESPONSIBILITIES BY FUNCTION

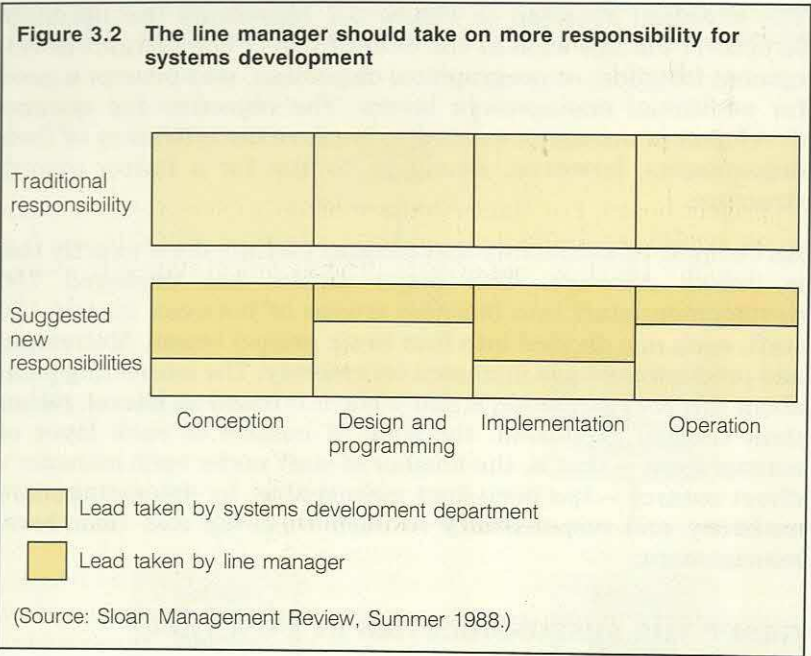
Within the simplified structure described above, each business group must be organised to fulfil the responsibilities defined in Chapter 2. We have identified three functional groupings at this level — systems development, education and user support, and systems maintenance. Three further functional groupings are required, which, because they provide a company-wide service, are most appropriately attached to the central systems function. These are systems planning, development support, and quality assurance.

SYSTEMS DEVELOPMENT

The systems development group is responsible for the detailed design, programming, testing, and implementation of all core systems and for ensuring that the systems conform with the central systems policy and standards. It is also responsible for those business-unit systems that need to be developed with traditional third-generation technology, for which specialist skills are needed. Such projects are, however, initiated by line managers, who are also the best people to manage them, because they are committed to the time and cost schedules and can mobilise user staff during implementation.

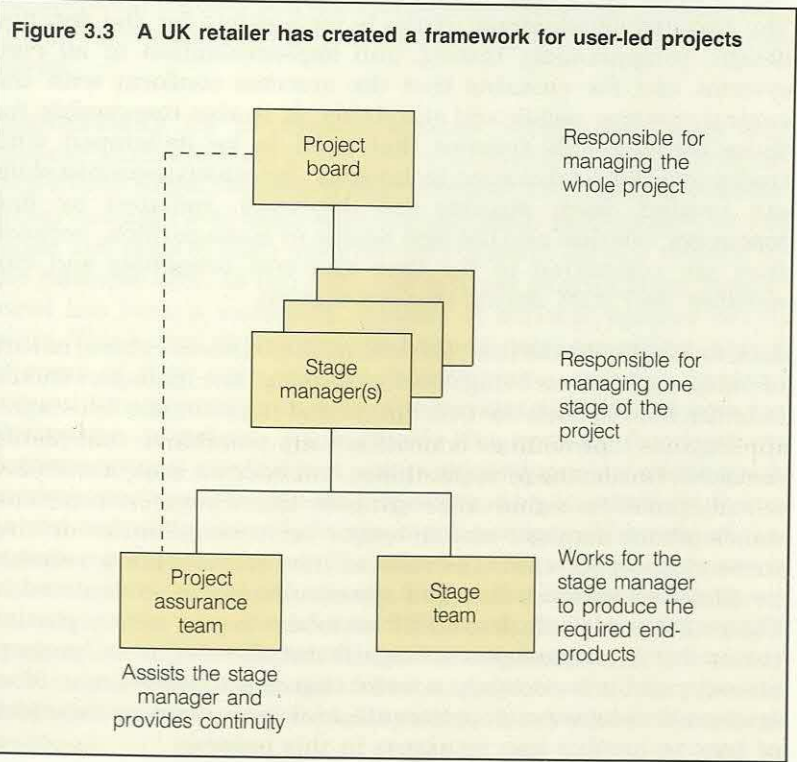
Line managers should take the lead in the conception and implementation stages of systems development

Jack Rockart believes that, because of the business-critical nature of many applications being developed today, line managers should take the lead in both the conception and implementation stages. He suggests that because it is not usually possible to cost-justify competitive-advantage applications, and because implementation usually provokes significant organisational changes, the systems development manager can no longer be responsible for driving these systems forward. His view of how responsibilities should be allocated between line and systems managers is depicted in Figure 3.2, overleaf. Some PEP members report active participation by line managers in significant development projects already, and it is certainly a trend that is set to continue. Most systems development departments, however, have no clear idea of how to involve line managers in this process.



One approach that has been successfully adopted by a large UK retailer is illustrated in Figure 3.3. It has the following elements:

- A *project board*, consisting of a senior systems representative, a senior user, and a business representative. The responsibilities of the board are to authorise, review, and sign off each 'stage' of the project. This includes appointing the stage managers, approving all plans, and appointing the project-assurance team.
- A *project-assurance team*, consisting of a business-assurance coordinator, a technical-assurance coordinator, and a user-



assurance coordinator. Appointed by the project board, they work for the stage manager(s) for the life of the project. Their responsibilities are to help prepare plans, monitor costs against budget, control change requests, and ensure that the appropriate development standards are applied.

- *Stage managers*, who are appointed for each stage by the project board. For stages that are heavily user-oriented, such as system specification, or installation, a suitable user is appointed as stage manager. For the technical stages, the stage manager is normally a systems specialist.
- *Stage teams*, appointed by the stage manager, and comprising user and systems staff, who report to the stage manager on all project-related matters, but to their line manager on all other matters.

The retail company that has adopted this project framework has noted several benefits from working in this way. Stage managers have been actively involved in ensuring that the user community is sufficiently committed to undertake a project. For their part, users have been prepared to make a much greater commitment of time and effort, and have assumed responsibility for ensuring that the systems provide all the appropriate facilities. As a result, better relationships and understanding have developed between business staff and systems staff.

EDUCATION AND USER SUPPORT

The education and user-support group trains users in all aspects of developing computer systems

The most crucial role of the education and user-support group is to educate and train users in all aspects of developing computer systems, from selection through to implementation. Its role includes ensuring that users are aware of the policy guidelines laid down by the central department on standards and protocols, back-up and recovery, security, and so on. Without this vital education and support, users will not be in a position to carry out their new responsibilities for providing their own systems adequately, nor to profit by learning from the mistakes previously made by systems professionals. A second role of the group is to act as consultants to the users, either providing support and assistance to help them acquire their own computer systems, or advising on the appointment of competent outside consultants or contractors to do so.

The precise role of the group will vary according to the stage of growth reached by the business in the use of each technology, as we described in Chapter 1. Thus, during the initiation and expansion stages, the education and user-support group will have a limited role, generating ideas and enthusiasm for new applications, providing education, and perhaps, supplying packages. During the formalisation and maturity stages, it will play a bigger role, imposing some order by ensuring that emerging standards for data security, integrity, and communications are applied, and facilitating the sharing of data and programs between business units.

The key to the success of this group is the personality of the user-support personnel. The more successful user-support services tend to be staffed by user-sympathetic and solution-oriented people, rather than by those who are more interested in technical details.

Obviously, the user-oriented support person needs to be sufficiently technically competent to advise on the right technical solution or software package as well, but the emphasis has to be on business fit rather than technical elegance.

To add value, user-support personnel must be very well acquainted with the business area. We have found that the most successful user-support groups are those that are distributed to the user area, rather than located within the systems department, regardless of whether management control is devolved. At Ahold, the Dutch supermarket chain, the user-support personnel have become so vital to the business that many are recruited into line management positions, where they continue to help users exploit the use of computer systems.

SYSTEMS MAINTENANCE

Maintenance accounts for a growing proportion of programming and analysis effort. In some installations, it can be as high as 65 per cent. The efficient organisation of this type of work requires a different approach from that of systems development. The focus of the systems maintenance group is to support the daily requirements of the existing business, and to be reactive rather than proactive. The group is therefore oriented towards responsiveness and service delivery.

In PEP Paper 8, *Managing Software Maintenance*, published in November 1988, we suggested that PEP members should consider setting up a separate maintenance group. We found that staff morale and motivation were significantly higher when maintenance was set up as a separate function. This view is supported by Joseph Izzo, from a California-based management group that specialises in improving company efficiency. He suggests that systems departments have two missions. The first is to maintain today's systems and to provide as fast a service to the users as possible. This, he has found, is seldom achieved. The second mission is to work on tomorrow's systems. However, when the schedule on a 'today' project slips, people are inevitably taken away from a 'tomorrow' project. The most efficient way to organise systems maintenance work, according to Izzo, is to organise it as a separate group, and to concentrate on measures to improve service levels. His approach to the organisation of maintenance is one that could usefully be adopted by PEP members and is described below.

Organising maintenance as a separate group results in improved staff morale and motivation

The first step is to set up two teams — one for product support, and one to deal with 'intermediate' requests. The product-support team deals with requests likely to take less than 160 hours of effort. A separate project-based group deals with 'intermediate' requests — those estimated to take between one month and one year of effort. Requests that are estimated to take more than one year of effort are deemed to be development rather than maintenance projects.

Two maintenance teams are required

The product support group is staffed by senior people who know how to handle users. They deal with maintenance requests as they arise. No priorities are set, but requests must be authorised by a line manager. In companies that have installed such a group, turnaround is significantly improved, and the systems department's credibility

is improved in the user community. The key to success, Izzo found, is to appoint a service-oriented manager to run the group. Contrary to normal expectations, he finds that after about a year, staff actually want to join the team, because its members are regarded as 'heroes' by the user community. PEP members who have set up such groups confirm this experience.

The intermediate group is run by a project manager, and the work is costed and scheduled as for any new development work. These projects are all authorised and priorities are set by senior line managers. Because the team is allowed to concentrate on one job, the typical pattern in installations organising maintenance in this way is to meet 80 to 90 per cent of the scheduled deadlines.

There are two significant points about this way of organising maintenance work. The first is that the maintenance group should be seen as an important part of the systems department. This means that it should be led by a high-profile manager, and should be staffed by service-oriented personnel. The second is that line managers should take responsibility for the maintenance function — requesting, authorising, and setting priorities for the work. Motivation and productivity will both improve as a result.

SYSTEMS PLANNING

The central systems planning group plans the company's software infrastructure

The central systems planning group is responsible for planning the company's software infrastructure, which is essential to ensure that future systems can be integrated. This includes defining the operating systems, languages, database management system, data dictionary, communications protocols, and user-interface standards that will be used throughout the company. The planning group will ensure that core applications comply with the components of the software infrastructure to form a flexible basis for developing non-core applications. The group will ensure that, wherever possible, non-core applications also comply, although a non-core application that does not conform to the standards, yet provides a good business solution, is preferable to one that conforms but is inferior in business terms.

DEVELOPMENT SUPPORT

Separate teams of systems professionals support development teams in the use of different tools and techniques

Several PEP members are finding it useful to establish a separate team of systems professionals who support development teams in the use of different tools and techniques. The responsibilities of this development-support group include the provision of training in the use of modern development tools, project-management techniques, CASE tools, and so on. They are known by several different titles — we have heard them referred to as the systems research group, the advanced technology group, and the development centre. The aim of the group is to concentrate specialist expertise into a 'research and development' type of role, in which the team members are not distracted by development work. Generally, these are small teams, and provide a useful way of concentrating specialist skills.

We see one potential problem with this arrangement, however. The effective introduction of modern development tools depends on a close match between the tool and the use to which it will be put, as we described in PEP Paper 10, *Making Effective Use*

of Modern Development Tools. Teams that are isolated from the business environment will not be best placed to make this selection, and care must be taken to ensure that the development-support staff work jointly with development staff and business users when choosing a development tool.

QUALITY ASSURANCE

For many PEP members, the quality assurance group is a recent addition to the systems development department. With responsibilities for systems development being increasingly devolved to business-unit level, the role of a quality assurance team is a vital part of ensuring company-wide compliance with central systems development policy. The responsibilities of this group are, first, to develop (or cause to be developed), standards, procedures, systems development and project-management methodologies, and management practices. The second responsibility is to ensure that compliance audits are carried out, by reviewing all major projects within the systems development organisation at prescribed intervals.

A quality assurance team ensures company-wide compliance with central systems development policy

MAXIMISE THE CONTRIBUTION OF THE INDIVIDUAL

We began this chapter by explaining the importance of highly motivated staff to running an efficient department. The skills shortage, which is apparent in all European countries, makes staffing a particularly critical issue, and one that most systems development managers will recognise as their biggest current problem. Motivating staff entails equipping them for the new roles that are emerging from the re-alignment of the systems function to the business, and taking positive measures to maximise the contribution of each individual. This will require systems managers to pay particular attention to job interest and career paths, both of which feature prominently among the factors that influence systems staff when they consider changing jobs (see Figure 3.4). We describe four specific actions that can be taken by systems development managers to ensure that each of their staff is making the greatest possible contribution.

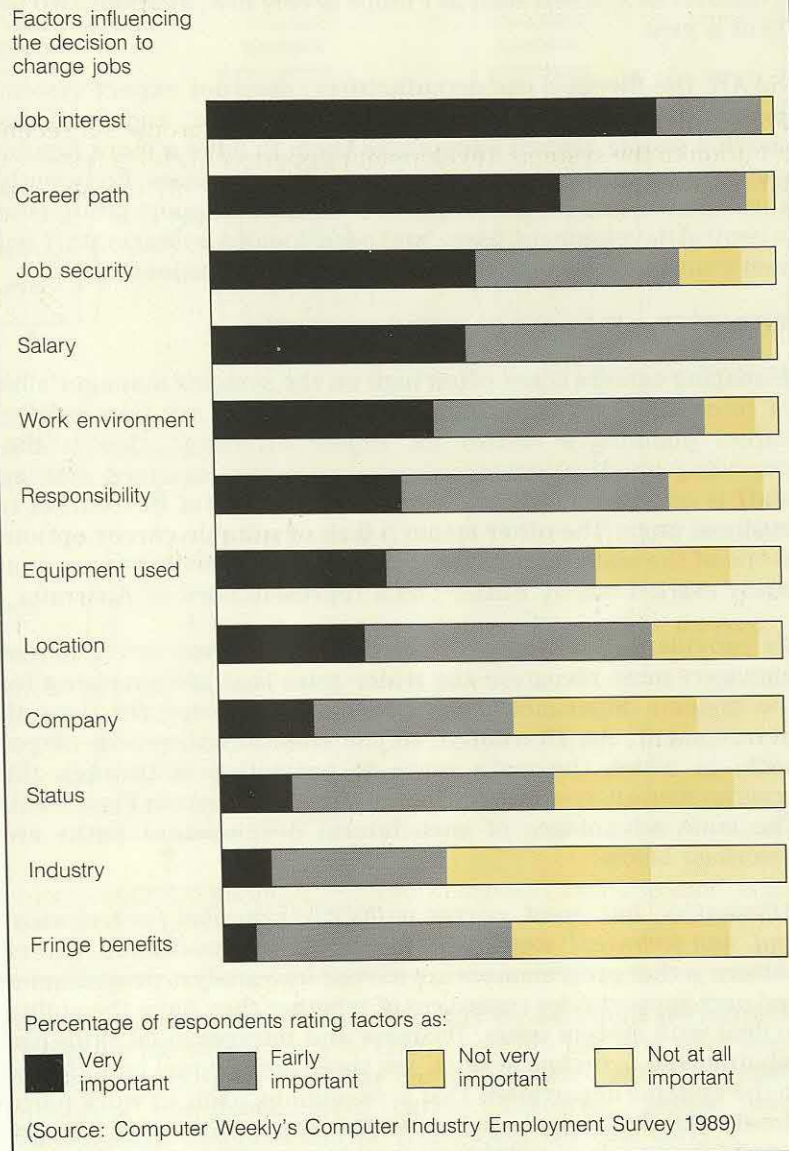
Systems managers will need to pay particular attention to job interest and career paths

BROADEN THE SCOPE OF JOBS

The role of the systems development professional is becoming more diverse. To develop the types of systems that are being used to support business activities directly, it will be critical for systems staff to have some knowledge of the business. The greater involvement of users in the development process, using modern development tools, will require systems staff to have people-oriented skills. We have also described how jobs that are usually regarded as more 'technical', such as systems maintenance, are performed far more successfully by service-oriented people. These trends point to the need for staff who are able to operate far more flexibly than has been the case in the past. The role of the education and user-support specialist, for example, requires technical programming skills, business knowledge, analytical ability, and interpersonal skills. These can be acquired only by enabling as many people as possible to operate in wider roles.

In response to these pressures, there is an increasing trend to move away from the traditional role of programmer, analyst, or

Figure 3.4 Job interest and career paths are rated the most important considerations by systems staff in changing jobs



A more hybrid role will be appropriate

business analyst, towards a more 'hybrid' role, such as an analyst programmer who uses modern development tools. There are two major advantages to widening the scope of systems development jobs. The first is that it creates a more flexible workforce, who are able to undertake a wider variety of work in response to changes in demand. The second is that the individual gains greater job satisfaction and is likely to be more productive.

INTRODUCE JOB ROTATION

Moving staff between jobs is a useful way of broadening the skills of the individual, increasing job interest, and improving motivation and productivity. Philips, a multinational company based in the Netherlands, for example, provides positive encouragement for job rotation. Below management grades, staff are expected to spend no more than two or three years in the

Chapter 3 Organising systems development for efficiency

same place; at management level, this is extended to four years. The philosophy is one of encouraging change, fresh insight, and creativity, while trying to minimise 'ownership' of systems. Turnover of systems staff at Philips is very low, at about two per cent a year.

SAAB, the Swedish car manufacturer, does not expect systems people to stay in one job for more than a year, and finds that moving people around encourages them to have a more flexible outlook and gain a wider appreciation of the business. Frequently, these moves involve a transfer to a business-support group from a central development team, and occasionally, systems staff will move into line-management positions in the business area.

INTRODUCE A FLEXIBLE CAREER STRUCTURE

Managing careers is not often high on the systems manager's list of priorities. Two important issues, however, are now making career planning a matter for urgent attention. One is that providing practical career advancement for dispersed systems staff is one of the critical features of successful devolution to business units. The other is that a lack of suitable career options is one of the main reasons for staff leaving, according to a recent study carried out by Butler Cox's representative in Australia.

To provide a flexible career structure, systems development managers must recognise the wider roles that are emerging for the systems department, and provide more scope for 'lateral' development. An alternative to the traditional vertical career path, in which the main route to promotion is through the programmer/analyst/project leader path, is shown in Figure 3.5. The main advantages of such lateral development paths are described below.

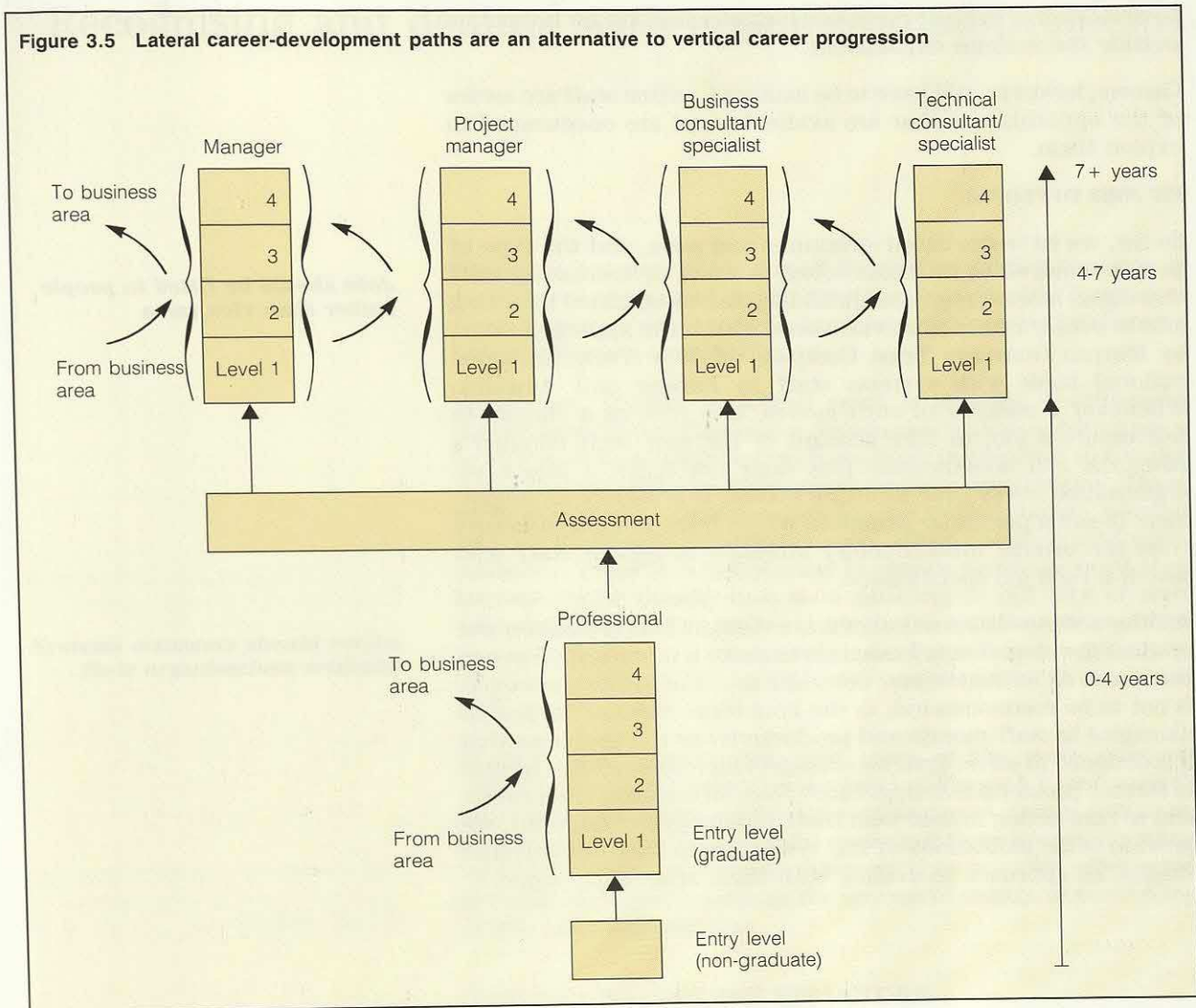
Alternative, but equal, career paths are provided for technical and non-technical staff. One result of the traditional career pattern is that programmers are moved into analyst/programmer and user-support roles regardless of whether they have the ability to deal with system users. Business and interpersonal skills are subordinated to technical skills, yet these are of equal importance to the systems department that is re-aligning itself to work more closely with its business partners. The key is to provide a structured framework of suitable career opportunities for everyone, recognising the potential value of both technical and non-technical skills. In most businesses, this will also require a change in the pattern of recruitment to test for the appropriate personality traits that will allow recruits to operate successfully in broader, business-oriented roles. In this structure, promotion to a senior level is possible for both technical and non-technical staff, without either having to move into a management post.

Line and project-management paths are explicitly provided. A major disadvantage of the typical promotion path, based on technical performance, is that it leads both to over-promoted technicians, who are unable to function adequately as managers, and to unfulfilled managers, whose real talent may be hidden behind average technical performance. In both cases, valuable expertise is misdirected, and inefficiency results. The Australian study that we mentioned earlier recommends that people with

Providing a flexible career structure implies more opportunities for lateral development

The typical promotion path leads to over-promoted technicians and unfulfilled managers

Figure 3.5 Lateral career-development paths are an alternative to vertical career progression



limited management ability, who may be excellent performers, should be identified early — that is, within the first four years of their career — so that they can be provided with an equally satisfying non-management career. Likewise, people with management potential can be trained for the role early.

Movement between career paths, and to and from business areas, should be encouraged

Lateral movements are planned and encouraged, both between major career paths, and to and from business areas. In this model, all staff spend up to four years gaining a wide knowledge of the profession. Lateral movements between different roles (maybe in different business groups) are encouraged, and all junior systems staff are seconded to business areas as a necessary part of learning the job. After four to seven years, the individual builds on basic skills and moves into a career path, with lateral movement still possible between paths and to business areas. After seven years, an individual usually finds it extremely difficult to move across paths. Lateral movements into the business provide systems staff with much-needed business knowledge, and help to bridge the cultural gap between systems and business staff. Current evidence suggests that systems departments are net importers of skills from line management functions; unless this inflow is balanced, there is a danger that systems staff will

Chapter 3 Organising systems development for efficiency

be demotivated by their perceived lack of suitability for promotion outside the systems department.

Careers, however, still have to be managed, so that staff are aware of the opportunities that are available, and are encouraged to exploit them.

FIT JOBS TO PEOPLE

So far, we have discussed structures and roles, and the type of people required to fill these roles. In times of increasing staff shortages, however, greater flexibility can be obtained by fitting jobs to people rather than vice versa. This is the approach taken by Morgan Guaranty Trust Company of New York, an international bank with systems staff in Europe and America. Whenever a member of staff moves, it is seen as a chance to restructure a job, to take account of the new staff member's strengths and weaknesses. This does not mean a major reorganisation every time someone leaves. It is merely an adjustment to suit a particular situation, which frees Morgan Guaranty from the usually unsatisfactory attempts to recruit staff who match a rigid job specification.

All the actions discussed above are designed to reposition the systems development organisation to make it more responsive to the needs of its customers. Constant re-organisation, however, is not to be recommended; in the long term, this can be just as damaging to staff morale and productivity as the problems that it is designed to solve. Systems managers therefore need to be able to foresee problems that might arise from an organisational cause, and to take action to deal with them promptly. In Chapter 4, we provide some indications of the symptoms to look out for, and suggest an approach to dealing with them at an early stage.

Jobs should be fitted to people rather than vice versa

Recognising and dealing with organisational problems

Change is uncomfortable for all those who participate in it. It unsettles everyone and diverts attention from the job. Businesses must, however, adapt to changing circumstances, or they become both ineffective and inefficient.

Sometimes, change is forced upon a systems development department. Some of the major changes we have seen taking place in PEP members' installations have been in response to a major restructuring of the business group, such as privatisation. These occasions provide a good opportunity for radical change, because staff are likely to be unsettled anyway. When change is not forced, however, there is a temptation to ignore problems until they become major issues, such as a doubling in the rate of staff turnover. We advise systems managers to review their organisations critically, and frequently. As Tom Peters suggests in *Thriving on Chaos*, "If it ain't broke, you just haven't looked hard enough. Fix it anyway".

Systems managers should review their organisations critically

In this final chapter, we take some of the more common organisational problems that we listed in Figure 1.1, and suggest appropriate solutions. Successful organisational change, however, cannot be based solely on logical reasoning; there are usually many vested interests in keeping things as they are. We offer some guidelines on how to manage the process of change to avoid some of the potential pitfalls.

ASSESS THE CURRENT STRUCTURE

Every systems manager should regularly take a critical look at the organisation of systems development. Recognising an organisational problem, however, is not straightforward. As we mentioned in Chapter 1, a perfect structure may be rendered ineffective if there are personality conflicts. Likewise, an inefficient structure can be made to work by dedicated and talented staff. Systems development organisations evolve in many ways. We commented on one structure that had evolved because of history and personalities, and on others where layers of management had been introduced as a means of conferring status on people.

The main function of an organisation structure is to enable staff to perform effectively and efficiently

The primary function of an organisation structure, however, is to enable staff to perform effectively and efficiently. This means that systems managers should review every aspect of their current structure, and decide whether it is contributing to or hampering performance. To understand whether the systems development organisation is achieving its goals, it is important to ask the following questions:

- Is the systems development department helping the business to meet its goals and objectives today, and if it is left alone, will it continue to do so in the future?

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- Is the systems development department well regarded by users and does it support their needs?
- Is the systems development department meeting its delivery expectations, and is the quality of its work producing the desired results?

Positive answers to each of these questions will indicate that the department is well organised and does not need to change. We would be surprised if this were the case in many businesses. Systems managers who are unable to give positive answers must urgently focus their attention on how the department can help support the business as it should, and on what kind of re-organisation is required to provide such help in an effective and efficient manner.

Their first consideration should be the department's effectiveness. There is little value to be gained from enhancing productivity if the department is seen by line managers as playing a 'peripheral' role in helping them to meet their business goals. In some cases — for example, in a professional services company, where systems will never be critically important to the business — a limited role for the systems department is perfectly legitimate. In other cases, where systems either play a critically important role today, or are beginning to assume critical importance, a limited role is a serious handicap. Generally, the more important systems are to the business, the more vital it is that the management structure of the systems department be closely aligned with the management structure of the group as a whole, if the department is to be really effective.

The more important systems are to the business, the more closely their management styles should be aligned

Within the business, the systems department may find itself operating in one of four typical environments, defined by Warren McFarlan and James McKenney in an article published in the July-August 1983 edition of the Harvard Business Review as strategic, turnaround, support, and factory. These environments are defined in Figure 4.1 and described below:

The systems department typically operates in one of four types of environment

- *Strategic* system environments are those where the company is critically dependent on the smooth functioning of its current systems for its daily operations, and where applications under development are vital to its competitive success. Banks are a good example.
- *Turnaround* environments are those where the company uses systems to support its daily operations, but is not critically dependent on them. The applications under development, on the other hand, are absolutely vital to achieving the company's strategic objectives.
- *Factory* environments are those where the company is critically dependent on the smooth functioning of its current systems, but where those under development will not play a strategically vital role. In the factory environment, a company has its important business systems in place, and further major investment in systems is unlikely to improve its competitive position.
- *Support* environments are those where the company is not critically dependent on the smooth functioning of its current systems, and those under development are not likely to affect its competitive standing.

Figure 4.1 The strategic importance of current systems and of those being developed defines the environment in which systems development operates

Strategic importance of current systems	High	Factory Current systems play a critical role in the business; systems under development will support business operations	Strategic Current systems and those being developed play a critical role in the business
	Low	Support Current systems and those being developed support business operations	Turnaround Current systems support business operations; systems under development will play a critical role in the business
		Low	High
		Strategic importance of systems being developed	

(Source: McFarlan, F W and McKenney, J L. The information archipelago — governing the new world. *Harvard Business Review*, July-August 1983.)

Where a department is functioning in a strategic or turnaround environment, and where it is perceived by line managers to be ineffective, systems managers must take urgent action to review the alignment of the systems function with the management structure of the business. They must ensure that the patterns of communication between the systems department and line managers are simple, and that they are directed at the right level of business manager.

The department that is operating in a factory or support environment must support and be well regarded by users. In these environments, the development workload is likely to contain a high proportion of system enhancements (that is, adaptive and perfective maintenance), and user-developed applications. The systems manager needs to take a critical look at how the department is managing its end-user relationships, and to ensure that user-support personnel are placed physically close to the users whom they are trying to support.

Systems managers who are satisfied that their departments are operating as effectively as possible in their particular environment can legitimately turn to reviewing their efficiency. This is not a one-off exercise; these organisational alignments must be kept constantly under review. The danger signs to look out for are low motivation and morale, lack of coordination between functions, rising costs, and poor response to systems development opportunities. Sometimes, all the symptoms can prevail in the same organisation, with the result that much effort is diverted from operating productively, to overcoming obstacles raised by inappropriate structures. Ways of resolving these organisational problems are discussed in the next section.

Reviewing departmental efficiency is not a one-off exercise; it must be kept constantly under review

IDENTIFY AND RESOLVE COMMON PROBLEMS

The following problems, taken from the list in Figure 1.1, were frequently mentioned by systems managers during our research. The suggested solutions are based on the approach to systems development organisation that we have described in Chapters 2 and 3, and are summarised in Figure 4.2. They fall naturally into those that have an impact on the systems department's effectiveness, and those that affect its efficiency.

Figure 4.2 Common organisational problems can be resolved with reference to the approach suggested in this report

Organisational problems		Suggested actions
Problems that affect the systems department's effectiveness	Failed attempts to decentralise	<ul style="list-style-type: none"> — Train staff fully for their new roles prior to decentralisation — Manage careers centrally to retain broad opportunities — Introduce job rotation to prevent isolation
	Low 'presence' in the business	<ul style="list-style-type: none"> — Appoint business manager(s) to foster relationships with senior line managers — Ensure that organisational management style aligns with group management style — Devolve some user-support staff to business areas
	Priorities set too low	<ul style="list-style-type: none"> — Ensure that organisational management style aligns with group management style
	No overall systems planning	<ul style="list-style-type: none"> — Clarify the respective responsibilities of user and systems staff — Introduce a planning group to develop and enforce a coherent software infrastructure
	User confusion over communications	<ul style="list-style-type: none"> — Re-align systems development to form business groups and channel all user communications through the business-group manager
Problems that affect the systems department's efficiency	Low productivity	<ul style="list-style-type: none"> — Use smaller teams (no more than six people) — Widen the scope of jobs — Shed some management layers
	Rising development costs	<ul style="list-style-type: none"> — Appoint users to manage projects
	High staff turnover/lack of suitable career structure	<ul style="list-style-type: none"> — Widen the scope of jobs — Introduce and make explicit a lateral career structure — Shed some management layers
	Development of poor-quality systems by users	<ul style="list-style-type: none"> — Set up an education and user-support group staffed with business-oriented personnel

PROBLEMS HAVING AN IMPACT ON EFFECTIVENESS

Failed attempts to decentralise — A common reason for the failure of attempts to move centralised staff into a business area is lack of preparation. There are usually cultural barriers to break down for both systems staff and business-unit staff. One PEP member observed that "when you put a user together with a systems designer, what you get at first is nothing like either of them

had in mind . . . then they work on it'. Often, the systems staff are cut off from their colleagues and unable to integrate successfully with their new business partners. There are two important prerequisites before this type of re-organisation can take place. One is to train staff fully for their new roles, prior to dispersing them. The other is to manage careers, so that staff in small, decentralised units are given the same opportunities to move into different posts as their 'centralised' colleagues. Frequent job rotation can also prevent feelings of isolation.

A business may be more critically dependent on systems than line managers recognise

Low 'presence' in the business — As we have explained, computer systems do not play a strategically important role in every business. It is quite possible, however, for a business to be more critically dependent on systems than line management recognises. If a particular systems department believes this to be the case, low presence is clearly a problem. It can often mean that business management is devolved, while systems development remains centralised and is thus seen to be remote and irrelevant to the business. In these circumstances, there is usually a wide cultural gap to overcome as well, and raising the profile of the department will inevitably be a slow process.

The most successful way to increase the presence of the department is to concentrate on a growth area such as sales, marketing, or production, and to appoint a business manager to foster a more positive relationship with line management. To build on the relationship and to ensure that systems are produced that the department actually wants, some user-support staff could subsequently be devolved to the business area.

Priorities set too low down — This is really a variation of the previous problem, and is usually a symptom that line management does not recognise the value of computer systems to its business area. Priorities, however, should not be decided by the systems department. It is senior line management's responsibility to decide how much money to invest in systems, and what the business priorities are for development. This can be achieved only by senior systems management fostering a partnership with senior business executives, and encouraging them to agree on a systems strategy and priorities; this is more easily accomplished if the management style of systems development is closely aligned with the group-management style.

There are often no clear guidelines on the respective responsibilities of users and systems staff

No overall systems planning — This is a common problem in organisations that have neither laid down clear policies and guidelines governing the respective responsibilities of users and systems staff, nor defined a common systems architecture within which coherent planning can take place. The first priority is to establish the principle that users should decide what systems are developed, and that systems staff should provide the standards required to enable applications to be shared by business units if needed. A systems-planning group can then be created to develop and enforce the standards necessary to safeguard flexibility, compatibility, and consistency in systems development, through a common software infrastructure.

User confusion over communications — The proliferation of various 'information centres' and user-support groups, as well as multiple development centres, can be confusing for user

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departments. To ensure that the most appropriate service is always offered, it is essential to provide the user with a single point of contact. This should be the business-group manager.

PROBLEMS HAVING AN IMPACT ON EFFICIENCY

Low productivity — Organisational changes can help with productivity. They include using smaller teams (no more than six), introducing more flexible jobs, and shedding some layers of management.

Organisational changes can improve productivity

Rising development costs — These are frequently caused by poor management of the product-definition and construction stages. Appointing users to manage projects will usually result in a better definition of the project objectives, tighter control over project enhancements, and better marshalling of user-department resources during implementation. The result should be better control over costs.

High staff turnover/lack of a suitable career structure — There are many reasons for high staff turnover that are not within the scope of an organisational change to cure. A surprisingly consistent body of research, however, has identified lack of job interest and lack of a suitable career structure as prime causes of discontent. It is interesting to note that the highest turnover rates usually occur amongst the newest recruits. These people have often been recruited from a university background in which they enjoyed considerable autonomy and status. Fitting into a structure with a steep reporting hierarchy can be daunting and demoralising. In organisations with fewer layers and flatter structures, staff turnover is usually considerably lower. Widening the scope of jobs, and creating a more satisfying career structure, such as the one we have described in Chapter 3, will also help reduce staff turnover.

In organisations with fewer layers, staff turnover is usually much lower

Development of poor-quality systems by users — Users should be encouraged to experiment with new technology in order to learn how to apply it appropriately to their business area. As we have seen, it is a mistake to try to control their efforts too soon. Often, the reluctance of users to consult systems staff is a legacy of poor previous service, lack of interpersonal skills in system staff, and a poor appreciation of real business problems by the systems department. The best way to foster a better working partnership is to set up an education and user-support group, to be located in the business area and staffed by user-sympathetic personnel. Their role will be to encourage and guide the users' efforts. This type of role is best performed by people with a bias towards business rather than technical solutions.

Users must be encouraged to consult systems staff if they are to develop effective systems themselves

PLAN FOR CHANGES TO BE IMPLEMENTED GRADUALLY

None of the solutions suggested above will be achieved without planning, consultation, and a realistic assessment of the speed with which they can be implemented. In Chapter 1, we said that organisational design is not just about structural form. This is nowhere more apparent than when planning organisational changes. Change is always viewed by those it affects in terms of personal gains and losses, and even changes of a trivial nature will probably meet with some resistance. Changes that break up

Organisational change will always meet with some resistance

established, informal social groups, reduce the number of hierarchical levels, enrich the jobs of subordinates, re-allocate functional groupings, and so on, are therefore likely to be viewed as a serious threat — to established routine, job security, promotion prospects, personal authority, professional development, or an individual's market value. It is essential that in initiating any form of re-organisation, systems managers 'market' the advantages of the proposed changes and accept that the changes will be achieved only slowly. The guidelines below explain how this can be done.

SECURE SENIOR MANAGEMENT SUPPORT

Senior managers, more than anyone else, have the power to make organisational changes work, and it is therefore essential that both senior systems and user staff are involved in and support any organisational change that affects the way the systems development department is to deliver its service. This includes devolution to business units, and the appointment of business-group managers and user project managers. Without the support of senior management, it will be impossible to align the systems department successfully with the business, particularly as it depends on user managers being prepared to be accountable for initiating, developing, and implementing computer systems.

PLAN FOR INCREMENTAL CHANGE

Unless there are deadlines imposed for completing the organisational changes, it is better to progress through small discrete steps, and to monitor progress before attempting the next step. This does not mean that the department should be subjected to continuous change, because this will definitely reduce productivity. The objective is to move gradually towards a simpler, more flexible structure, in which only minor adjustments are needed in the future. The smooth devolution of resources to the business areas, for example, is frequently achieved by appointing a 'roving' consultant, who is attached to the central unit. Subsequently, a small, permanent team is established in the business area and gradually built up. The success of one venture encourages other business units to seek a similar service.

ACQUIRE THE NECESSARY SKILLS

Modifying the management structure of systems development will not foster better business relationships unless staff have the skills to make it work. Staff will need to acquire business knowledge, develop interpersonal skills, and adopt a marketing and service-oriented attitude to be able to fill the new user-support roles. This will take time to achieve, and should be encouraged through a combination of formal training and secondments to business areas. Often, a new approach to recruiting is required, based on assessing appropriate personal attributes.

INVOLVE PEOPLE APPROPRIATELY AND AT THE RIGHT TIME

Much initial resistance can be forestalled by consulting staff well in advance of any proposed organisational change, explaining the benefits, and encouraging feedback. Major structural changes should be formally publicised to both users and systems staff, and time set aside for getting their feedback. Objections should be

The objective is to move gradually towards a simpler, more flexible structure

Proposed changes should be publicised, and objections answered

expected and answered. It is unnecessary, and possibly counter-productive, however, to involve all staff in all changes, unless they are directly affected, because this might encourage unnecessary objections.

PLAN FOR A REALISTIC TIMETABLE

Major organisational changes can take up to a year or more to settle down, and even minor ones can take a few months. They all need to be planned and prepared for in advance, and staff must be given time to adjust. One systems manager we heard of tried a novel but disastrous approach. One morning, he presented everyone with their new job titles as they arrived at work. This took a few moments to do. Changing the skills and attitudes of the staff and making them effective in their new roles took rather longer, particularly with the dramatic increase in turnover that ensued.

KEEP PEOPLE INFORMED

Everyone, including user staff, should be regularly updated on the objectives of any re-organisation and on the current state of progress. A regular newsletter or bulletin will help to create an environment that is more conducive to change, and will also help to market the idea to users that the systems department is actively pursuing a programme of improvement to provide a better service.

A regular newsletter helps keep staff informed

MONITOR PROGRESS

Progress needs to be explicitly monitored and plans altered if the organisational changes are not achieving the expected benefits. In particular, staff morale needs to be carefully handled through counselling, career guidance, training, and so on.

CONSIDER THE USE OF THIRD PARTIES

If the organisational changes are likely to be either significant or widely resisted, it may be beneficial to use third parties to identify the need for change, and recommend the type of change that is necessary. Third parties could be outside consultants, academic specialists from a management school, or the business's own organisational specialists, who are not part of the department directly affected by the change. Third parties are generally seen to be neutral, but must be used strictly in a diagnostic and analytical role — systems managers must still take ultimate responsibility for managing and implementing the changes if they are to succeed in gaining employee commitment.

Our guidelines for managing the process of change are summarised in Figure 4.3. The overall objective is to move gradually towards a simple and flexible structure that should be resilient enough to cope with further business and technical changes without constant upheaval. Although each systems department's unique set of circumstances will influence the extent of re-organisation that is needed, the design principles set out in Chapters 2 and 3 of this report are universally applicable. Systems managers who accept and act upon this advice will place themselves in a strong position to help the business to achieve its goals and objectives by providing excellence in systems.

Figure 4.3 Summary of guidelines for managing the process of change

- Secure top management support.
- Plan for incremental change.
- Acquire the necessary skills.
- Involve people appropriately and at the right time.
- Plan for a realistic timetable.
- Keep people informed.
- Monitor progress.
- Use third parties, where appropriate.

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Butler Cox plc
Butler Cox House, 12 Bloomsbury Square,
London WC1A 2LL, England
☎ (01) 831 0101, Telex 8813717 BUTCOX G
Fax (01) 831 6250

Belgium and the Netherlands
Butler Cox BV
Burg Hogguerstraat 791,
1064 EB Amsterdam, The Netherlands
☎ (020) 139955, Fax (020) 131157

France
Butler Cox SARL
Tour Akzo, 164 Rue Ambroise Croizat,
93204 St Denis-Cédex 1, France
☎ (1) 48.20.61.64, Télécopieur (1) 48.20.72.58

Germany (FR)
Butler Cox GmbH
Richard-Wagner-Str. 13, 8000 München 2, West Germany
☎ (089) 5 23 40 01, Fax (089) 5 23 35 15

United States of America
Butler Cox Inc.
150 East 58th Street, New York, NY 10155, USA
☎ (212) 891 8188

Australia and New Zealand
Mr J Cooper
Butler Cox Foundation
Level 10, 70 Pitt Street, Sydney, NSW 2000, Australia
☎ (02) 223 6922, Fax (02) 223 6997

Finland
TT-Innovation Oy
Meritullinkatu 33, SF-00170 Helsinki, Finland
☎ (90) 135 1533, Fax (90) 135 1091

Ireland
SD Consulting
72 Merrion Square, Dublin 2, Ireland
☎ (01) 766088/762501, Telex 31077 EI,
Fax (01) 767945

Italy
RSO Futura Srl
Via Leopardi 1, 20123 Milano, Italy
☎ (02) 720 00 583, Fax (02) 806 800

Scandinavia
Statskonsult AB
Jungfrudansen 21, Box 4040, 171 04 Solna, Sweden
☎ (08) 730 03 00, Fax (08) 730 15 67