

02,  
MANAGEMENT PATTERNS IN MUNICIPAL ENGINEERS' DEPARTMENTS

by

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## INTRODUCTION

The reasoning supporting the publication of the Municipal Engineering management data sheets is given in Appendix 1. The pre-publication advertisements for the sheets stated inter alia

"ME's management data sheets will provide a systematic and methodical approach to learning about management, the main aim being to provide a wide base of management knowledge from which each person can develop in the way best suited to his own career. The series will cover all aspects of management in local government, and will provide an invaluable source of basic knowledge as well as basic references to more detailed, authoritative material for those who want it."

The series begins with sheet 8.00 which contains the subject and author indexes for all the sheets published between 26 May 1972 and 9 April 1976. Each sheet or group of sheets is followed by a commentary (vide Appendix 1, paragraph 1.5), each of which was written as soon as the sheet had been written, and before it had been published.

The outline of subjects for the whole series was compiled in detail before the writing began, and subjects were selected for

- a) their basic importance to management knowledge, and
- b) their relevance to local government reorganisation.

Because of the long list of official reports which it was intended to include, and the need to cover techniques of which there is also a long list, a suitable mix of (i) basic subjects, (ii) techniques and (iii) official reports has been used (and will continue to be so), on which to base the order in which the subjects of the sheets are written. General subjects are numbered 8.00 to 8.16, techniques 8.30, and official reports 8.31. Thus the sheets have not been written in the numerical order in which they are filed, but each one is dated.

The many assertions made in the commentaries are based on experience and are simply immediate impressions recorded when the appropriate sheet was complete.

## MUNICIPAL ENGINEERING

### MANAGEMENT DATA SHEETS

#### List of File Reference Numbers and Subjects

8.00	Management index (18 June 1976)
8.01	Retrospect: background note (26 May 1972)
8.02(1)	Organisational theories (9 June 1972)
8.02(2)	Organisational theories (24 November 1972)
8.03	Principles of management (23 June 1972)
8.04(1)	Structure: organisation charts, Drucker, Treasury O & M (7 July 1972)
8.04(2)	Structure: Brown, top-level structures (21 July 1972)
8.04(3)	Structure: Coventry, GLC (4 August 1972)
8.04(4)	Structure: Bains report (27 October 1972)
8.04(5)	Structure: Paterson report (23 June 1974)
8.05	Authority (1 September 1972)
8.06	Corporate management (19 January 1973)
8.07	Delegation (2 March 1973)
8.08	Centralisation and decentralisation (30 March 1973)
8.09	Management of change (11 May 1973)
8.10(1)	Decision making (8 June 1973)
8.10(2)	Decision making (20 July 1973)
8.11(1)	Leadership (28 September 1973)
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8.12	Individuals (8 February 1974)
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8.30(1)	Techniques: (PPBS) (23 November 1973)
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8.31(5)	Official reports: (Loftthouse) (4 July 1975)
8.31(6)	Official reports: (Loftthouse) (15 August 1975)
8.31(7)	Official reports: (Loftthouse, 2nd report) (26 September 1975)

# MANAGEMENT

## FILE REFERENCE 8.00 MANAGEMENT Index

*This is an index to the subjects mentioned in 39 Management data sheets published to 9 April 1976, file references 8.01 to 8.31 (7). It replaces the index published on 24 August 1973. For most subjects only paragraph numbers are given, and the first figure in a number indicates the file reference of the appropriate sheet, while the number after the point indicates the relevant paragraph on the sheet. For example 10.5 against 'decisions, programmed', shows that the subject will be found in sheet 8.10, within paragraph 10.5. Where a whole sheet deals with one subject, eg 'Management, Principles of', the file reference of the sheet itself is given, viz 8.30. Bold type is used to indicate a sheet or paragraph which treats a subject at some length.*

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MANAGEMENT

FILE REFERENCE 8.01  
Retrospect

*This data sheet is a background note to the series on management. Professional engineers at all levels exercise a management function, and so do many technicians and supervisors. From as long ago as the ancient civilisations, the construction of roads, canals, harbours and the development of water supplies have involved the organisation of resources by engineers on a large scale. But until recently there has been little interest among engineers in management training. Things have changed; there is now a widespread demand for management knowledge among professional engineers. This data sheet sets the scene for the series.*

MANAGEMENT

1.1 Definition

Mallaby The Committee on the Staffing of Local Government (Mallaby) defined management as 'getting things done through other people'.  
LGTB The Local Government Training Board defines it as 'the process of establishing what needs to be done within an organisation and getting it done through other people', and says that 'at the lower levels those who carry out these management tasks may be termed supervisors'.

1.2 Function

Mallaby Management, says the Committee on the Staffing of Local Government, 'involves the setting of objectives and planning how these objectives are to be achieved; the organisation and harmonising of the work of various individuals and groups of people; the control of costs and the appraisal of results. Throughout this process there are innumerable decisions to be taken at various levels of responsibility.  
Manager's task 'The manager's task is to define and analyse problems and having decided on the best solution to take effective action. It is his responsibility to promote efficiency, to encourage innovation, to give effective leadership and to ensure that his staff are fully and profitably employed'.

1.3 Civil engineering

Telford Construction of the great civil engineering works in this country began about 200 years ago. During the 18th century Thomas Telford organised the construction of canals, harbours, roads and bridges.  
McAdam: organisation for maintenance About the same time John Loudon McAdam evolved a sound method of road construction, but he was also very much concerned with developing effective management because of his experience of the then bad organisation for road maintenance. Made surveyor general of roads in Bristol, he reconstructed roads for less than the previous cost of maintenance alone. McAdam realised that it was the organisation of maintenance that was wrong, since the responsibility was spread over too many people, and work was entrusted to unskilled men.  
Industrial revolution The widespread development of canals and then later of roads and railways was all part of the industrial revolution. The use of the factory system under which it became convenient to have people working at machines under one roof and supplied by power (water or steam) from a central source expanded. During the

19th century the number and size of factories grew apace creating management problems. Similar problems will face a reorganised local government.

1.4 Management thinking  
(i) Early pioneers

Babbage: division of labour; incentive schemes Charles Babbage (1792-1871): a Cambridge mathematician who published his treatise *On the economy of machinery and manufactures* in 1832. He dealt with the division of mental and physical labour, incentive schemes, optimum size of factories and financial control. His work was important and original but perhaps too early.

Taylor: scientific management F W Taylor (1856-1915): an American engineer who is generally regarded as the founder of 'scientific management'. He wrote *The principles of scientific management*. Against a background of low productivity, low wages and distrust between employers and their employees, Taylor asked the basic question — how much work should a man do in a day? He carried out experiments; he set men to work and measured their output; he studied how the work was done, seeking to improve their methods. He considered bad management to be the sole reason for the conflict between employers and their employees, but he was hostile to trade unions.

Gantt: humanist H L Gantt (1861-1919): an associate of Taylor's whose attitude to trade unions was friendly because he was interested in the human aspects of men at work; he improved on Taylor's system of payment in later years.

Gilbreth: motion study on brick-laying F B Gilbreth (1868-1924): an associate of Taylor's who is best known for his work on motion study including his original work on brick-laying. He was able to increase individual output of bricks laid per hour from 120 to 350. Gilbreth's wife Lilian (1878-1972) was a trained psychologist who not only assisted him in his work but also carried it on with distinction after his death.

Lilian Gilbreth  
Fayol: management or administration Henri Fayol (1841-1925): an engineer who began his career at the Commentry pits in France, eventually becoming managing director of the Commentry-Fourchambault Company. He was interested in the whole problem of managing an organisation. He considered industrial organisations to contain six groups of activities: technical, commercial, financial, accounting, security and managerial. He did not distinguish between *management* in industry and *administration* in government.

# 8.01 MANAGEMENT

**Weber: formal organisations**  
**Max Weber (1864-1920)** : a German scholar whose interest was formal organisation. His work on bureaucracy as a system of organisation is of particular interest to local government.

## (ii) Later pioneers

**Follett: human relations**  
**Mary Parker Follett (1868-1933)** : her later work was concerned with human relations and their effect on management. Conflict was to her a result of the different attitudes displayed by individuals when viewing the same situation. Settlement of conflicts could be by domination, compromise or integration and she considered the first two to be unsatisfactory.

**Mayo: work-study**  
**Elton Mayo (1880-1949)** : best known for his studies at the Hawthorne works of the Western Electric Company, beginning in 1924. This research involved separate groups of girls working together under controlled conditions in the factory and extended over five years. It came to be realised that group loyalty had a powerful effect on productivity and that physical conditions and even pay were much less important than had been thought.

**group loyalty**  
**L F Urwick** : born in 1891, he is probably the best known writer on management in this country. His particular interest is formal organisations, and his writings are closely associated with those of Fayol. His book *The elements of administration* (Pitman) sets out 'principles of administration', which he recognised as being common to the thinking of people of different nationalities, of widely varying experience yet who had worked independently, and he believed this to be highly significant.

**Urwick: formal organisations; principles of administration**  
**E F L Brech** : is a writer of particular interest to the construction industry, being a one time chief executive of the Construction Industry Training Board. In *The principles and practice of management* (Longmans) he, following Fayol and Urwick, sets out just four basic functions of management: planning, control, co-ordination, and motivation.

## 1.5 Management in local government

**Problems of scale**  
 Small enterprises can be organised without a large degree of management skill, but when organisations become large and complex the situation is very different. Small units of local government have been able to carry out their duties generally to the satisfaction of the public with a general lack of management expertise among both elected members and officers. With larger units this will no longer be possible.

**Common problems**  
 It is clear from the work of pioneers in management thinking that there is much in common between management in government, local government and industry.

**Maud and Mallaby reports**  
 Being concerned about the future of local government, the four local authority associations persuaded the Government to set up on 3 March 1964 two committees, one on management

(Maud) and the other on staffing (Mallaby). The Maud report deals primarily with management at council, committee, and chief officer level; and the Mallaby report deals with it at departmental level. Both assume sound management knowledge in the reader.

## 1.6 Management and the municipal engineer

**A typical department**

Ernest J Elford, engineer, architect and surveyor to the Metropolitan Borough of Wandsworth, wrote *Municipal engineer and surveyor's department* (Pitman) in 1928. He describes the structure of his department and enumerates its duties. The numerous forms used in the department for wages, contracts, records etc are reproduced.

**Shortcomings**

He illustrates the structure of council committees by a typical 'organisation chart' which shows 14 main committees and 20 sub-committees. He does not say how the system in his office works in practice, nor whether all the forms that are reproduced in the book are used as designed. There is no discussion about relationships between people or about communication with them.

His description of the structure is accurate; it did not claim to be a book on management, neither is it, but some engineers may have thought it was. It represents the view that engineers generally have taken of organisation and administration.

**Misconceptions**

Management is the concern of professional engineers from the beginning of their training and it is probably this experience which leads them to believe that since they have been brought up to deal with men, materials and money, they are therefore managers. The belief goes further — it is thought that people without this experience are not managers. They tend to believe that management skills are necessary only in the 'production' departments. But these are misconceptions.

**The future**

Engineers were at the forefront of investigations into management problems and the development of management theories but their place has been taken by others. Until recently some municipal engineers took a limited view of their management function. Management knowledge will be a prerequisite of a successful professional career in the reorganised local government.

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The majority of chartered municipal engineers are unaware of the very wide field of management knowledge extant today. They are aware that there are numerous management techniques which they believe will be sufficient to solve their immediate day to day problems; many may think their need is no greater than that, and even if they were but vaguely aware of the extent of management knowledge, are likely to dismiss it as being applicable only to the private sector.

When the writer applied to go to the ten-week Advanced Course in management for senior local government officers at the Institute of Local Government Studies, Birmingham University, he had been a chief officer for twelve years, and was a practising manager in charge of about two hundred staff and workmen, and spending considerable sums through contractors. Not only that, he was also responsible for administration as between the Borough Council, its committees, and his department. He was therefore involved in the formulation of policy-making as well as its execution.

The pre-course reading included one book which opened up for him a whole field of knowledge that he did not know existed. Its value to the manager was immediately apparent. He was astonished that such knowledge existed and that, having read everything pertaining to management that he had found referred to in the local government press and professional journals, he was totally ignorant of: Management and the Social Sciences by Tom Lupton written for the Administrative Staff College.

The major drawback of the Birmingham course was that they were trying to show the disadvantages of the way in which local government formulated policy, how there was very little control over the allocation of funds to different services, how the strength of departments was both an advantage and a disadvantage, and the effect of professionalism on local government, but at the same time trying to introduce students to management knowledge itself.

In the four years since he completed the course, the writer has read widely on all the major aspects of management, and this is the kind of knowledge one really needs before attending the Advanced Course.

He has found in his studies that the clear solutions he expected to be taught do not exist; that management is the exercise of one's talents moulded by a knowledge of people, of organisations, of constraints, of the likely effects of decisions and so on.

As engineers we have been taught that there are specific solutions to specific problems, and the knowledge that there are a number of solutions to a management problem (dependent only on the constraints one chooses to give prominence to) comes hard to us.

It was the writer's awareness of the need for better tools in his hands to improve his performance as a manager that led him to go to INLOGOV. Yet on completion of the course he felt more uncertain than ever. However, his studies over the last four years (i.e. 1968-72) have instilled a confidence in his ability as a manager that he previously lacked. The tools that he has developed rest solely on wide knowledge, and not at all on techniques. It is this new-found confidence that he wishes to make available to all municipal engineers, and the method chosen is to write a number of Data Sheets. These will each be on a specific management subject, and will distil for the busy engineer the extent of management knowledge, and its relevance for the municipal engineer.

In the first sheet 8.01, he has tried to link the work of some of the pioneers in management studies to civil engineering in general, and then to municipal engineering in particular. Among the pioneers he has included E.F.L. Brech (who would probably not normally be considered as such) because he will be seen by engineers as a link between management knowledge and the construction industry.

He has specifically mentioned Elford's book because what it contains

is what usually passes for management in municipal engineering circles, and he wished at the outset to point out its shortcomings. In the bibliography he has been careful to include books having a direct relevance to engineers. This is because he feels that many engineers will be put off by even the content of this carefully composed Data Sheet. What these sheets contain must be seen by engineers to have direct relevance to their work or they will cease to read them, and this whole grand concept will fail.

He knows of no other person or organisation who has set out to produce a concise survey of management knowledge specially prepared for one profession, including an assessment of its relevance to the members of that profession.

Each data sheet is limited to about 1600 words, and while it is possible to have any number of sheets for a particular subject, he has chosen to make an arbitrary selection of some 30 or so 'subjects' and to cover each of them in one sheet if possible.

Each sheet will thus necessarily be brief and concise, and will cover only the main essentials of the subject. There will not be any discussion in depth of management ideas or problems. This may be done later in different form. The reader who is interested can pursue the subject via the bibliography.

Therefore the writer expects that most of the sheets will hold value for engineers at all levels from those who are studying for the I.M.E. part 3 examination, and to those who are already occupying senior positions but who do not possess the required management knowledge.

MANAGEMENT

FILE REFERENCE 8.02(1)  
Organisational theories

*This data sheet and 8.02(2) review the various types of organisations that have been identified by management thinkers. To understand how an organisation functions it is first necessary to identify its type. It may be said that all organisations are different, and while this will be true in detail, there are broad characteristics of organisations which allow each one to be identified more closely with one type than with another. Knowing broadly which type of organisation one works within, produces an understanding of the constraints inherent in that organisation and also gives an understanding of how it functions, and with what advantages and disadvantages it may be changed into a different type of organisation.*

● ORGANISATIONS

2.1 Weber's three basic types

Max Weber (1864-1920), born in Germany, was an academic whose sociological studies led him to define three basic types of organisation: charismatic, traditional, and rational-legal (bureaucratic).

The value of Weber's work lay in identifying the three basic types. In practice, elements of all three basic types may be found in one organisation.

**(a) Charismatic:** some leaders have exceptional personal qualities which attract followers and by means of which they are able to exercise power. Such leaders possess charisma — a supernatural power held by some gifted people which enables them to elicit popular support. Charismatic leaders may be found in politics or religions, and perhaps more rarely in other spheres such as the armed forces and industry.

**Charisma**

**Instability**

Such organisations are likely to be unstable because they depend on one man. When his powers fail or he dies, the organisation loses its mainspring and several claimants to the leadership arise, thus dividing the organisation. Whatever happens, it is likely to cease to be a charismatic organisation.

**(b) Traditional:** leadership in a traditional organisation is hereditary and in many such organisations it passes from father to son. Custom and precedent are the guides to current and future action; appointment and promotion may depend more on family relationships than on ability; matters are dealt with as they always have been and methods are justified on that basis, ie because they have always been done that way.

**Heredity**

**Kinship**

**Continuity**

**(c) Bureaucratic:** bureaucracy is the name usually given to Weber's rational-legal type of organisation and, of the basic forms, is that most clearly identifiable with government, local government, and professional institutions. The system is rational because it has been formed to achieve specific goals. It is legal because authority within it is exercised according to rules and procedures which have been properly approved within the organisation and which are followed by office-holders. Weber considered bureaucracy to be the most efficient possible form of organisation and likened it to a machine. It is impersonal, and therefore not subject to a leader's own fancies, nor is it hidebound by traditional practices. Each post in a bureaucracy has its own place in the hierarchy, and each successive level embraces all those beneath it.

**Rational/ legal**

**Efficiency**

**Hierarchy**

2.2 Bureaucracy in practice

**(i) Weber:** Weber's concept of the rational-legal (bureaucratic) type of organisation depended for successful functioning on the willing acceptance by all its members of the authority wielded at each level.

**Authority wielded**

**Authority questioned**

In practice this authority is often questioned, for the most part covertly, but overtly if the person wielding power is considered by his subordinates to have exceeded his authority. Weber defined two main reasons why people obey instructions: one, because they are compelled to (power); and two, because they are willing to (authority). Thus in the armed forces for example people obey commands because they are compelled to, whereas in most civilian occupations instructions will only be obeyed if people are willing to do so. This implies acceptance on the part of the people obeying instructions that those in authority over them have legitimate power to issue such instructions.

**(ii) Gouldner:** A W Gouldner, an American sociologist, has identified three types of bureaucracy which are closer to what we find in practice than is Weber's basic rational-legal type. They are mock, representative, and punishment-centred.

**(a) Mock bureaucracy:** this differs from Weber's bureaucracy in that the rules and procedures, instead of being formulated from within the organisation are imposed from outside or by a remote headquarters. Safe working rules, on a construction site for example, may come into this category. When such rules are imposed no one within the organisation regards them as legitimate and they are freely broken; indeed mutual esteem by supervisors and subordinates is encouraged by the mere breaking of such rules, and morale may be thereby increased.

**Rules imposed**

During inspections by the rule-making authority, however, the rules are temporarily enforced so that the true situation is not revealed to the inspectors.

**(b) Representative bureaucracy:** this differs from Weber's bureaucracy in that the rules are formed by experts but are nevertheless in conformity with the wishes of all levels within the organisation. They are therefore honoured and not broken as in the case of mock bureaucracy.

**Expert's rules**

For example, the by-laws and regulations for the proper running of a professional institution would probably come into this category.

**(c) Punishment-centred bureaucracy:** in this fairly common type of bureaucracy one group of people formulates rules to be obeyed by the

**Group rules**

## 8.02(1) MANAGEMENT

group, and this results in problems for a different group or groups. For example, workers may devise rules in respect of overtime working which have the effect of reducing the freedom of planning work which management would otherwise have.

Status within the group is maintained by individuals obeying their own rules rather than by breaking other people's rules as in representative bureaucracy.

### 2.3 Characteristics of bureaucracy

Rosemary Stewart defines four main characteristics of bureaucracy: specialisation, hierarchy of authority, system of rules, and impersonality.

**Specialisation** *Specialisation* occurs in any group of people working together and its distinctive feature in a bureaucracy is that it relates to the job and not to the person; thus specialisation carries on when a person leaves his post.

**Hierarchy of authority** *Hierarchy of authority* is clearly distinguishable in all bureaucracies and is a familiar feature of municipal engineers' departments. It manifests itself in staff charts and job descriptions.

**System of rules** The purpose of a *system of rules* is to produce efficiency, and a knowledge of those rules is required in all postholders.

**Impersonality** Rosemary Stewart holds that *impersonality* is the characteristic which distinguishes bureaucracy most clearly from other forms of organisation. The exercise of authority impersonally, according to the rules, should ensure fair treatment for all within the organisation and for those affected by its decisions.

### 2.4 Burns' two basic types

Professor Tom Burns is a British sociologist who has evolved the concept of two basic types of organisations, based on the type of work they have to do. They are: (a) mechanistic; (b) organismic. He regards these as forming either end of a spectrum which includes an infinite variety of type of organisation within it, combining characteristics of the two basic types in varying degrees.

**Stability** (a) **Mechanistic**: the mechanistic type corresponds closely to Weber's bureaucracy. It is relevant to organisations such as the armed forces and to a lesser extent to local government which are comparatively stable. It has a clear hierarchy and each post has its job description; instructions are passed down through the chain of control, obedience is expected and loyalty fostered.

(b) **Organismic**: at the other end of the spectrum Burns defines an organic type of organisation which is relevant to unstable conditions: where for example the problems that arise are new, and cannot be dealt with merely by allocating them to the appropriate individual as in the case of the mechanistic system. Job descriptions are not appropriate unless so widely drawn as to cease to be really useful. Interaction between individuals occurs at any 'level' in the organisation and in any direction, not merely vertically as in the mechanistic organisation. Such a type of organisation may well be found within the generally mechanistic local government organisation, in perhaps social services or architect's departments.

### 2.5 Organisation for production

Joan Woodward, who <sup>was</sup> Professor of Industrial Sociology at the Imperial College of Science and Technology, University of London, approaches the definition of organisational types in a different way. Miss Woodward's work is not based on abstract thinking about types of organisation, but on the practical investigation and comparison of certain aspects of management in different technologies and in firms of different sizes.

**Categories** She categorises firms by type of production and distinguishes three categories: unit and small batch, large batch and mass production, and process production. Most municipal engineers' departments would fall into the first category, although Joan Woodward was concerned in this particular research project with manufacturing industries.

**Types/aspects** Within these three broad categories, which she subdivided into nine types, Miss Woodward examined individual aspects in each type so as to establish the differences between them. These were levels of authority, span of control, definition of duties, the amount of written communication, and the extent of the division of duties among specialists.

**Hierarchies** In unit and small batch production, the hierarchy is short, span of control is wide, and administrative controls are few. Conversely, in process production hierarchies tend to be long, and administrative personnel tend to form a large proportion of total employees.

**Critical function** In each of the three basic categories of organisation, there is a critical function which has most effect on success. In unit or batch production it is development that has most importance; in mass production it is production; in process production it is marketing.

### 2.6 Organisations as systems

The *system approach* to the theory of organisations conceives an organisation as an open system involving three stages: input — conversion — output.

**Input** The *input* comprises resources and information from the environment.

**Conversion** *Conversion* is the process whereby the input is changed into goods and services, eg plans for a highway improvement or sewage disposal works; or a service is provided such as deposited plan inspection.

**Output** *Output* is the end product of the conversion process returning the input to the environment and would result in for example the construction of the highway improvement or sewage disposal works, or in the provision of a building inspection service.

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## A Municipal Engineering Data Sheet

The theory of organisations is one of the most interesting in the management field. Most people are probably employed in bureaucracies, and the variations on Weber's basic theme come close to reality. It is particularly important in local government to understand where power and authority lie, and how these are exercised.

The sheet only briefly covers the systems concept of organisations because it seems to be a difficult concept for local government officers to understand, particularly if the rest of the Sheet is new to the reader. Later on the writer may write a supplementary sheet dealing with newer theories, including matrix organisations.

He has excluded all discussion in this Sheet of structure, and of how organisations function, for two reasons, limitation of space, and the need to introduce new ideas a few at a time.

The sheets will be published at, say, six-weekly intervals, and between issues, readers will have the opportunity of pursuing the references in the bibliography.

When local government reorganisation becomes effective on 1.4.74, the writer hopes to survey the 300 or so new authorities to find out what kind of organisational pattern, and what type of structure each engineer's department has adopted. He would suggest that in almost every case it will be bureaucratic, and based on Fayol's principles of administration, which will be dealt with in Sheet 8.03.

Indeed it is difficult to see how a new organisation could be set up in any other way since it would be formed out of an amalgamation of several former local authorities being themselves bureaucracies. Even if the existence of loose organisations such as Burns' organismic type were well known, and fully understood, it is unlikely that this form would appeal to most local government officers.



The recognition that an informal organisation exists at all, and that it has for the most part a useful function to perform came as a surprise to the writer and will do so to many local government officers. We are taught to believe that only those things that are authorised by law, or by the organisation, should be recognised, or permitted to exist.

MANAGEMENT

FILE REFERENCE 8.02(2)  
Organisational theories

Data sheet 8.02(1) considers organisational theories propounded by Weber (classical school), and Gouldner and Burns (behavioural school), and briefly discusses the systems theory. This sheet considers further the behavioural aspects of organisational theory, and discusses the complementary informal organisation.

● ORGANISATIONS

2.7 Organisational behaviour

	<p>(i) <b>March and Simon.</b> In <i>Organisations</i> (John Wiley and Sons Inc, 1958) authors James G March and Herbert A Simon define three broad categories of organisational theory based on assumptions about human behaviour in organisations:</p> <p>(a) 'Organisation members, particularly employees, are primarily <i>passive instruments</i>, capable of performing work and accepting directions, but not initiating action or exerting influence in any significant way'.</p> <p>(b) 'Members bring to their organisations <i>attitudes, values and goals</i>; they have to be motivated or induced to participate in the system of organisation behaviour; there is incomplete parallelism between their personal goals and organisation goals; and actual or potential goal conflicts make power phenomena, attitudes, and morale centrally important in the explanation of organisational behaviour'.</p> <p>(c) 'Organisation members are <i>decision makers and problem solvers</i>, and perception and thought processes are central to the explanation of behaviour in organisations'. March and Simon see nothing contradictory in these three sets of assumptions which underlie various organisational theories, believing human beings to have all the characteristics listed. However, an adequate theory of human behaviour in organisations needs to take account of the different attitudes in its members. These three models are used by the authors to classify the organisational theories postulated by numerous writers. They found that the first model (people as passive instruments) represented the thinking of the 'scientific management' movement. The second model (people need motivating) was found to have been prominent in the several decades preceding the authors' analysis, and the third model (people as decision makers etc) had been less extensively used than the other two.</p>	
Passivity		
Motivation		
Initiative		
Classification		
Theory X	<p>(ii) <b>McGregor.</b> In <i>The human side of enterprise</i> (McGraw-Hill, 1960) Douglas McGregor sets out his theories X and Y. Theory X is the traditional view of direction and control in management and it assumes that:</p> <p>(a) the average human being has an inherent dislike of work and will avoid it if he can;</p> <p>(b) because of this human characteristic of dislike of work, most people must be coerced, controlled, directed, threatened with punishment, to get them to put forth adequate effort toward the achievement of organisational objectives;</p> <p>(c) the average human being prefers to be directed, wishes to avoid responsibility,</p>	<p>has relatively little ambition and wants security above all'.</p> <p>Theory Y, on the other hand, postulates the integration of individual and organisational goals and assumes that:</p> <p>(a) the expenditure of physical and mental effort in work is as natural as play or rest;</p> <p>(b) external control and the threat of punishment are not the only means of bringing about effort toward organisational objectives. Man will exercise self-direction and self-control in the service of objectives to which he is committed;</p> <p>(c) commitment to objectives is a function of the rewards associated with their achievement;</p> <p>(d) the average human being learns, under proper conditions, not only to accept but to seek responsibility;</p> <p>(e) the capacity to exercise a relatively high degree of imagination, ingenuity and creativity in the solution of organisational problems is widely, not narrowly, distributed in the population;</p> <p>(f) under the conditions of modern industrial life, the intellectual potentialities of the average human being are only partially utilised'.</p> <p>McGregor states that though the perfect organisation, like the perfect vacuum, is almost out of reach, the use of the assumptions of Theory Y enables managers to discover new ways of organising and directing human effort.</p> <p>(iii) <b>Likert.</b> In <i>The human organisation</i> (McGraw-Hill, 1967) Rensis Likert states that most organisations base their standard operating procedures and practices on classical organisational theories (Weber, Taylor, Fayol, Urwick etc).</p> <p>However, classical management theory takes little account of the human component (March and Simon's 'passive instruments'), but to Likert the human component is 'the central and most important task' of all the management tasks.</p> <p>Likert defined four organisational systems: exploitive authoritative, benevolent authoritative, consultative, and participative, which he names Systems 1, 2, 3 and 4, and in a very detailed series of experiments involving many different groups of managers totalling several hundred persons he established that of the four systems the participative type, System 4, was considered to give the best results, but managers were nevertheless reluctant to apply it.</p> <p>Likert states that at least four conditions must be met by an organisation if it is to achieve a satisfactory solution to the co-ordination-functional problem:</p>
Slothful		
Coercion		
Direction		
Theory Y		
Play		
Coercion		
Commitment		
Responsibility		
Creativity		
Brainwork		
The human component		
System 4		
Four conditions		

Co-operation	(a) 'it must provide high levels of co-operative behaviour between superiors and subordinates and especially among peers. Favourable attitudes and confidence and trust are needed among its members;
Structure	(b) it must have the organisational structure and the interaction skills required to solve differences and conflicts, and to attain creative solutions;
Motivation	(c) it must possess the capacity to exert influence and to create motivation and co-ordination without traditional forms of line authority;
Decision-making	(d) its decision-making processes and superior-subordinate relationships must be such as to enable a person to perform his job well and without hazard when he has two or more superiors'. These four conditions, according to Likert, are not and cannot be met by Systems 1, 2 and 3, but System 4 — a science-based theory of management — offers the best opportunity for successful management.

Fast, inaccurate

Restricted information

Inevitable

(ii) **Grapevine.** Informal organisation provides fast, though often inaccurate channels of communication, known as the grapevine which is most active when the formal communication system is inadequate.  
The grapevine thrives on information which is not generally available within the formal organisation either because it is considered confidential or otherwise not suitable for disclosure.  
In *Principles of management* (McGraw-Hill, 1968) Harold Koontz and Cyril O'Donnell state: 'Since all informal organisation serves essential human communication, the grapevine is inevitable and valuable. Indeed, the intelligent top manager would probably be wise to feed it with accurate information, since it is very effective for quick communication'.  
The grapevine '... brings to members of a formal organisation a feeling of belonging, of status, of self-respect, and of gregarious satisfaction'.

2.8 Natural quality of hierarchies

Fundamental	Notwithstanding much discussion on organisational theories Herbert A Simon, in <i>The new science of management decision</i> (Harper and Row, 1960), states that the near universality of hierarchy in the composition of complex systems suggests that there is something fundamental in it that goes beyond the peculiarities of human organisation. He suggests two reasons why complex systems should generally be hierarchical:
Evolution	(a) hierarchical systems, composed of sub-systems, are the most likely to appear through evolutionary processes; (b) hierarchical systems require much less information transmission among their parts than do other types of systems'.

Deprivation

(iii) **Superfluous.** Wilfred Brown in *Organisation* (Heinemann, 1971) takes a very different view. He considers that 'informal organisation' is itself a contradiction in terms.  
He says that the widely held view that formality in the organisation of employment hierarchies deprives people of the right to make decisions and to be creative is false. Brown's view is that there ought to be precisely defined areas over which job holders make all the decisions and the functions of an informal organisation included within the formal one. A well-designed formal organisation thus excludes the need for an informal one.

2.9 Informal organisation

Interdependence	(i) <b>Essential complement.</b> In discussing modern organisation theory Peter P Schoderbek in <i>Management systems</i> (John Wiley and Sons Inc, 1971) defines the three interdependent parts of an organisation system as (a) the individual, (b) the formal organisation, and (c) the informal organisation. Thus in his view the informal organisation is an essential complement of the formal organisation. A manager is unable to plan all the activities that make up a total organisation. The people in an organisation amplify and modify the formal organisation to suit their needs and ends.
Disruption	Usually the informal organisation complements the formal organisation and therefore assists in meeting organisational goals. However, it may be used to meet personal goals only and thus be a disruptive force which impedes the achievement of organisational goals. Natural leaders who are not necessarily recognised in the formal organisation usually emerge within the informal organisation.

2.10 The ideal organisation theory

Universal prescription

It would be of considerable practical use if one organisation theory fulfilled the needs of all organisations. That is not the position at the moment. Indeed, Professor Tom Lupton in *Management and the social sciences* (Penguin modern management readings, 1971) in a chapter on organisation theory and its practical uses, says that managers are in practice inhibited in organisational design by the belief that there is a universal prescription for solving their problems. 'Managers acting in this way may fail to develop criteria for choosing the alternative which is best suited to the particular circumstances from those that are available'.

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Although the writer referred in his comment on 8.01 (1) to the possibility of including discussion on matrix organisations in this sheet, he considers that a matrix organisation is not part of the theory of organisation, but is rather a matter of practice. He proposes therefore to cover it in a sheet on organisations in use.

For lack of space, his notes on informal organisation were excluded from 8.02 (1) and they have been expanded considerably in 8.02 (2).

He finds the work of the behavioural school provides very satisfactory explanations of problems that arise, and points the way to solutions. It would be interesting to know why managers who profess to support 'participative' management (Likert's system 4) do not apply it themselves in practice.

It seems quite clear that they would wish it to be applied to themselves, but are not prepared to apply it to others, a phenomenon the writer is aware occurs (or has in the past occurred) in himself. Perhaps it arises because we have insufficient control over choosing our colleagues, unlike a prime minister who can re-shuffle his cabinet at annual intervals if colleagues don't fit.

It is interesting to note Brown's views on the superfluosity of informal organisation. To say this is a contradiction in terms as he does is surely to deny the existence of Burns' 'organismic' type. More significant perhaps is that he believes it possible to design an organisation which will include all the functions of an informal organisation.

Since we are so bad at designing organisations at all, it seems unlikely that his views are practicable for most of us, though his own work in this field at Glacier was remarkable.

# MANAGEMENT

## FILE REFERENCE 8.03 Principles of management

*Each one of us bases his management style, consciously or unconsciously, on principles that have been acquired through working with senior colleagues, and which stem mainly from the formal type of organisation in which we municipal engineers work, ie bureaucracy. Imbued with these principles, our day-to-day actions are automatically based on them. Since management is the art (or science) of getting things done through other people (see data sheet 8.01:1.1), it may be expected that the practice of management would be similar in all kinds of organisations, and that there would be principles which were common to them all.*

*The search for these principles has been made by practising managers and thinkers alike such as Fayol, Urwick and Brech. Their conclusions are reviewed in this data sheet.*

### ● PRINCIPLES

#### 3.1 Henri Fayol

Henri Fayol, who was trained as a mining engineer (data sheet 8.01:1.4(i)), firmly believed that management could be taught — a belief that even now is not universally accepted. He considered that an exclusively technical education was insufficient for management duties. He thought that technical ability alone was not the most important criterion for selecting people for supervisory tasks. His principles of management are contained in his book *General and industrial management* (Pitman).

(i) **Elements:** To Fayol, management was made up of five elements:

- the forecast and plan
- organisation
- command
- co-ordination
- control.

(ii) **Principles of management:** Fayol set out 14 principles which he had used most frequently but considered that there was no limit to their number, and felt that they should be adapted to the needs of the situation. Summarised they are:

(a) Task specialisation is natural; it allows the best use to be made of individuals and groups of people. It is applicable to all kinds of work.

(b) There are two kinds of authority: that which derives from the office held, and that from personal abilities and experience; both are needed for effective management. Authority is the power to issue instructions and obtain compliance with them. Responsibility automatically rests where authority is exercised. As the size of an organisation increases, so it becomes more difficult at higher levels to define responsibility precisely. In general, authority is much sought after but responsibility eschewed.

(c) Discipline is essential to the well-being and prosperity of the enterprise. Its nature will depend on how the rules of the organisation have been formulated (ie whether they have been imposed or arrived at by consultation), and on the quality of leadership.

(d) An employee should be given instructions from only one superior. In practice dual command is common but is to be deprecated since it leads to malfunction, conflict and unrest.

Unity of direction

(e) Activities having the same objective must be the responsibility of one superior working to one plan.

Subordination of individual interest

(f) The selfish interests of the individual or of groups of people are ever ready to usurp the interests of the organisation; but the general interest must prevail over the individual interest.

Remuneration

(g) Pay and emoluments should be satisfactory to both employer and employee, and the choice of type of payment may have a substantial effect on the prosperity of the enterprise. Remuneration should be fair but not excessive, and should encourage effort. All systems of reward have advantages and disadvantages.

Centralisation

(h) This is a natural tendency and is present in all organisations. The extent of centralisation depends on the amount required for each enterprise and will vary according to the size of the organisation and the capabilities of its members.

Scalar chain

(i) The scalar chain is the hierarchy of authority, comprising heads of sections each of whom is responsible to the next higher level in the hierarchy or chain. In theory the correct method of communicating between departments A and B at a lower level is upwards through each level in department A to the head of the organisation and downwards through each level in department B. In practice each lower level in department A will communicate directly with its comparable level in department B, with the knowledge and approval of their immediate superiors. Provided those superiors agree the action being taken by their subordinates it is not necessary to take decision-making any higher in the scalar chain. Fear of responsibility will make heads of sections use the scalar chain but senior executives should insist on direct communication between comparable levels in different departments so as to encourage the taking of responsibility at lower levels.

Order

(j) Material order consists of having a proper place for everything, and having each item in that place; mere tidiness is not sufficient. Social order provides similarly that there must be an established place for every employee and that each person should be in that place. It is also necessary that the place should be the right one for the person, and that the person should be right for the place. This implies a very good organisation and first-class selection. An organisation chart should be prepared, setting out the arrangement of posts and the people occupying them.

Division of work

Authority and responsibility

Discipline

Unity of command

## 3.03 MANAGEMENT

Equity

(k) Equity is the product of kindness and justice, and it needs to be applied to get people to give of their best.

Ability of  
nature

(l) A person engaged on different work takes time to learn it, and stability of tenure is needed for the enterprise to gain recompense for its investment in the person it has trained. Prosperous enterprises encourage stable management.

Initiative

(m) Initiative is the quality of being able to devise a plan, and carry it into effect. It is a powerful stimulus to achievement, and should be encouraged to the full in all employees. The superior who encourages initiative in subordinates does so at the sacrifice of some personal vanity, but such a superior is much to be preferred to one who stifles initiative in others.

esprit de corps

(n) Unanimity and accord are great assets to any organisation and should be particularly encouraged. Dissension should be avoided, and certainly never encouraged; communication should be verbal if possible since this method is quick and clear.

## 3.2 L F Urwick

His well known writings (*see data sheet 8.01:1.4(ii)*) closely follow those of Fayol.

**Principles of organisation:** Urwick distinguishes ten principles which he considers universally applicable. They were first published in *The elements of administration* by Pitman in 1947. The revised version which follows was published in *Notes on the theory of organisation* published by the American Management Association in 1952.

Objective

(a) Every organisation and every part of the organisation must be an expression of the purpose of the undertaking concerned or it is meaningless and therefore redundant.

Specialisation

(b) The activities of every member of any organised group should be confined, as far as possible, to the performance of a single function.

Co-ordination

(c) The purpose of organising *per se*, as distinguished from the purpose of the undertaking, is to facilitate co-ordination; unity of effort.

Authority

(d) In every organised group the supreme authority must rest somewhere. There should be a clear line of authority from the supreme authority to every individual in the group.

Responsibility

(e) The responsibility of the superior for the acts of his subordinates is absolute.

Definition

(f) The content of each position, including the duties involved, the authority and responsibility contemplated, and the relationships with other positions, should be clearly defined in writing and published to all concerned.

Correspondence

(g) In every position the responsibility and the authority should correspond.

Span of  
control

(h) No person should supervise more than five, or at the most six, direct subordinates whose work interlocks.

Balance

(i) It is essential that the various units of an organisation should be kept in balance.

Continuity

(j) Reorganisation is a continuous process; in every undertaking specific provision should be made for it.

## 3.3 E F L Brech

Brech considers management to contain four essential elements or functions (*see data sheet 8.01:1.4(ii)*) and eight principles. He makes it clear that he does not consider principles to have 'the firm force of law or the certitude of an axiom'.

(i) **Elements:** The four elements which he considers to make up management are:

planning  
co-ordination  
motivation  
control.

(ii) **Principles of organisation:** Brech recommends eight principles of organisation structure which summarised are:

Organisation

(a) Organisation is one aspect of planning, ie the determination and specification of appropriate operational and functional responsibilities and their inter-relationships.

Structure

(b) Structure is the framework for managing, delegating, co-ordination and motivation.

Definitions

(c) Responsibilities and activities of all members, and their inter-relationships, should be clearly defined.

Specialisation

(d) When the scale of operations makes sub-division necessary, it should be by specialisation of function or of operation.

Delegation

(e) When the scale of operations threatens to impair performance, delegation should be made to subordinates in direct line.

Hierarchy and  
span of control

(f) There should be a single head of the enterprise, decentralisation of decision-making, clear lines of responsibility, and a limited span of control.

Authority and  
responsibility

(g) Authority and responsibility are inseparable, but superiors are accountable for subordinates' actions.

Flexibility

(h) An organisation structure must remain flexible, and be capable of being changed to suit changes in basic circumstances.

## 3.4 Conclusions

The principles defined do not differ substantially as between one writer and another, and most municipal engineers who exercise a management function will use some if not all of them in whole or in part.

They form a useful guide, but their appropriateness in any given situation will depend on the type and scale of operations being carried out, and on the attitude, knowledge, and experience not only of the engineer himself, but of all the employees too.

## ● Bibliography

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Data Sheet 8.03 Principles of Management.    Commentary

Municipal engineers absorb many of the principles of management reviewed in this sheet from the very fact of merely working in bureaucracies. Most of them do not realise that over many years practising managers and management thinkers alike have thought about these principles and committed their thoughts to paper.

Many of today's senior engineers (and those of the previous generation too) had wartime experience of service organisations which operate as strict bureaucracies with clear and strictly enforced rules.

The main purpose of this sheet is to show that these principles have been thought about, and set down. Most municipal engineers would not question, for example, the validity of having a limited span of control, or the need for the concept embodied in the scalar chain. But the principles they use every day should be thought about, and their relevance to, and function within, their own organisation. Later sheets will discuss the place of these principles in a municipal engineer's office.

# MANAGEMENT

## FILE REFERENCE 8.04(1) Structure

The structure of an organisation is made up of the hierarchy of posts, their duties and gradings, and the relationships between them. As responsibilities increase, for example as a result of new legislation, the structure needs to be adapted to cater for the extra work load. The structure of a department, or of a local authority, is usually depicted in an organisation chart. An effective structure can only be devised after very careful consideration of all the relevant factors. Local government reorganisation will necessitate either the setting-up of new structures for departments and authorities or the expansion of existing ones.

### ● STRUCTURE

#### 4.1 Type of organisation

- Classical school
- (i) **Principles:** The structure of a municipal engineer's department, and of the local authority itself, is representative of the concepts of the classical school of management thinkers. Among these are F W Taylor, Henri Fayol, Max Weber, L F Urwick and E F L Brech (*data sheets 8.01, 8.02 (1) and 8.03*). The concepts include bureaucracy as the basic type of organisation applicable to local government, and principles of management outlined in data sheet 8.03 such as task specialisation, authority and responsibility, unity of command, hierarchy of authority and span of control.
- Form
- (ii) **Organisation charts:** An organisation chart shows the number of posts and the direct relationships between them, the line of authority and possibly the relative level of each post. A typical organisation chart for a municipal engineer's department is shown in fig 1. The director's span of control, including his deputy, is shown as eight. The largest span of control of one of the section heads is five. The higher levels on the chart are shown as posts and the lower levels as functions. A more detailed chart would show posts at all levels. Too much is sometimes expected of an organisation chart and charts of different shapes, triangular, circular and oblong, have been used in an attempt to represent the structure more fully. The chart does not make the structure; on the contrary the structure must be devised first,
- Value

after which it can be represented, at least in part, by means of a chart. Brech casts doubt on the real value of organisation charts, but Fayol was convinced of their value: 'summarised charts . . . facilitate considerably the building up and supervising of an organisation. They enable the organic whole, departments and lines of demarcation and the line of authority, to be grasped at a glance better than could be done by lengthy description. They draw attention to weak points . . . This mode of representation is suitable for all types of concern . . . The use of the summarised chart is not confined to the period of formation of a business. The chart offers particular facilities for discovering and providing against . . . repercussions (following change) but it must always be kept up-to-date . . . it is a precious management instrument'.

#### 4.2 The structure

The concept of bureaucracy as a particular type of organisation, and the definition of certain principles of management applicable to a bureaucracy, are the starting points from which the structure can be devised. It is necessary to know how many posts are needed, their relative levels, and the duties applicable to each. This information will come from careful analysis of work being done, or to be provided for.

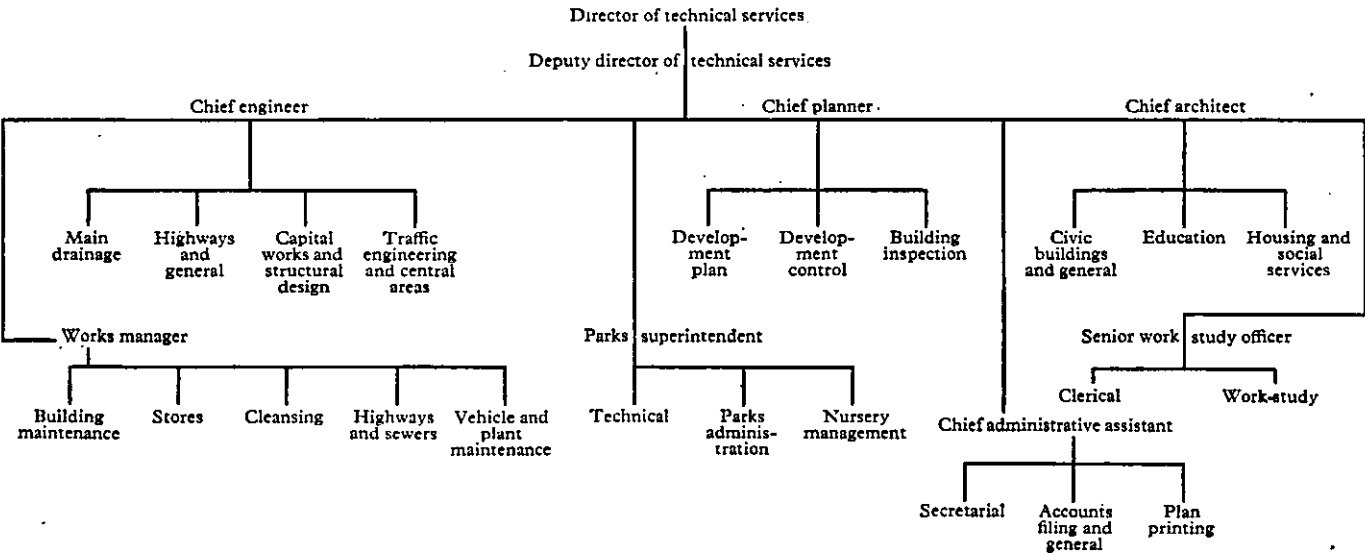


Figure 1: typical organisation chart for a municipal engineer's department  
(Reproduced by permission of the Institution of Municipal Engineers from 'Torbay County Borough: an exercise in local government reorganisation', M R Hawkins, IME conference 1970)



### 3 Analysis: Peter Drucker

In *The practice of management* (Pan Piper), Peter Drucker defines the three analyses required to determine what kind of structure is needed.

(i) **Activities analysis:** Insufficient thought is usually given to the way in which functions are actually performed, and only a detailed activities analysis can show what work has to be done, what kinds of work belong together, and what emphasis should be given to each activity in the structure.

ct of change This analysis repeated at intervals will reveal the changing relative importance of different activities. It will show that activities which have lost their major role are still carried on as though they remained important: 'the worst mistakes in organisation of activities are invariably the results of growth.'

(ii) **Decision analysis:** 'What decisions are needed to obtain the performance necessary to attain objectives; what kind of decisions are they; on what level of the organisation should they be made; what activities are involved in or affected by them; which managers must therefore participate in the decisions — at least to the extent of being consulted beforehand; which managers must be informed after they have been made?'

utine Most decisions that managers make are, he says, 'typical', and fall within a small number of categories. The greatest single cause of business failure is the inability of the head of the organisation to forego making decisions that should no longer be made at his level.

(iii) **Relations analysis:** Drucker asks 'with whom will a manager . . . have to work; what contribution does he have to make to managers in charge of other activities, and what contribution do these managers, in turn, have to make to him?'

tical and ral Because a manager is in charge of certain activities, his main relations tend to be seen in terms of his responsibility for those activities, ie downwards. This is inadequate; it is first necessary to consider what contribution his activity makes to the whole organisation, ie upwards. It is then necessary to consider lateral relations with other managers or departmental heads. The contribution one manager makes to the activities of another is always an important (sometimes his most important) activity. No matter how small the organisation, these three analyses should always be done very carefully and in depth. 'Only these analyses can show what structure the enterprise needs.'

### 4 Analysis: The Treasury O and M

The management services divisions of Her Majesty's Treasury in *The practice of O & M* define 'a number of basic factors which have to be considered when any organisation structure, regardless of size, is being planned'. Once planned and introduced, it should be kept under review, and changed to meet new needs. These factors must be provided for in any structure.

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(i) **Principles:** Some of the principles of management are restated and expanded as a set of structural principles, each of which should be applied to the organisation (existing or proposed) so as to devise a suitable structure. These are: division of work, delegation, line of authority and span of control. The following matters must also be considered in devising or reviewing structures:

Staff (ii) **Line and staff:** The role of the 'staff' man is defined as providing 'an extension of his chief's personality'. It exists 'to increase his effectiveness, and provides him with more eyes, ears and hands to aid him in forming and carrying out his plans'.

Line In contrast, the 'direct' or 'line' relationship is that which is normal as between a superior and his subordinates.

(iii) **Co-ordination:** 'Effective co-ordination . . . ensures that centrally determined policies are applied uniformly, and that everyone has a clear understanding of the aims of the organisation, how these are to be attained, the degrees of priority and so on'. There is a risk that the staff of specialised units 'will develop a narrow outlook, concentrating too closely on the aims of their own sections, perhaps to the detriment of the organisation as a whole'.

Horizontal relationships are the most important ones for effective co-ordination, and it is necessary carefully to define both duties and relationships as follows:

Formal consultation	the class of decision; who should be formally consulted before the decision is made; and the weight to be attached to the views of those consulted;
Informal consultation	who should be consulted informally, what advisory or common services should be used;
Other consultation	from whom should other classes of decisions be sought;
Relationships	to whom should advice be given and on what basis;
Relevant meetings	what meetings and conferences should one attend and for what purpose;
Policy formulation	in which areas of work is one to contribute to policy formulation.

The authors point out that organisation charts usually show only 'line' relationships, but *all* relationships, including horizontal ones, should be clearly defined and understood if the structure is to be sound.

(iv) **Centralisation and decentralisation:** In most larger organisations some decentralisation becomes necessary, for example in the creation of divisions or areas for highway maintenance work. The authors set out the main advantages of each system.

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- Brech, E F L: *Organisation: the framework of management* 2nd edition 1965.  
Tillett, A, Kempner, T, and Wills, G, editors: *Management thinkers*, Pelican Books.

CONTINUED ON DATA SHEET 8.04(2)

## A Municipal Engineering Data Sheet

MANAGEMENT

FILE REFERENCE 8.04(2)  
Structure (contd)

Data sheet 8.04(1) deals with organisation charts, and the kind of information suggested by Peter Drucker and the Treasury's Management Services Division as being required before a structure can be devised. This sheet sets out the requirements suggested by Wilfred Brown and considers two top level structures.

4.5 Analysis: Wilfred Brown

The most detailed analysis of the total work situation that has been made was carried out at the Glacier Metal Company by Wilfred Brown, chairman and managing director from 1939 to 1965, and Dr Elliott Jaques, the social scientist. Their findings have been set out in several books including *Exploration in management* by Wilfred Brown (Penguin): 'Our observations lead us to accept that optimum organisation must be derived from an analysis of the work to be done and the techniques and resources available'.

(i) **Executive analysis:** It was found that analysis of work and organisation by a member of the firm did not give entirely satisfactory results because of the work relationship which the investigator has with those he is observing or questioning. 'Completely free communication is not . . . available to managers or technical people carrying out such analysis'.

In confidence

(ii) **Independent analysis:** This occurs when the person carrying out the analysis is not a member of the firm and has no executive relationship with anyone in the company. In the Glacier company investigations, this analysis was done by the Tavistock Research Team led by Dr Jaques. In such investigations all communications are completely confidential, and analysis of work is carried out only at the request of individuals, managers or groups responsible for the work. This approach to investigation and analysis of the work situation has brought out data and ideas which would not otherwise have been obtained.

Three systems

It was found that there were three inter-connected systems operating in the company: the executive, representative and legislative. By means of this analysis in depth, it has been found that what is required *inter alia* is a good knowledge of 'what makes up good organisations, how it is brought into being and manned by the people who can operate it successfully'.

(iii) **Malorganisation:** Work is continually changing; individual responsibilities are increased as new legislation or regulations become operative, and failure consciously to adapt the structure to deal with change will lead to malfunctioning, and to uncontrolled adaptation. If objective analysis is not carried out periodically the following situations will occur, according to Brown:

Imbalance

(a) the organisation may partially adapt itself to changes in work but this will result in some people being overworked and others underworked;

Apprehension

(b) if overworked but coping successfully the post-holder will feel underpaid; if underworked he may be apprehensive about future prospects;

Out of control

(c) changes that are forced on the structure in a manner that is not explicitly recognised

generates a feeling that the situation is not under control. Uncontrolled adaptation does not produce optimum organisation forms;

Understanding

(d) where changes are made as a result of a series of ad hoc decisions, they arise from lack of understanding, and the situation masters the managers instead of the managers mastering the situation. 'Only by understanding can managers have a mastery of the situation'.

Resistance

(e) changes that arise due to pressures rather than from planning produce anxiety and resistance to new methods.

(iv) **Structural forms:** The organisational structure will be made up of job descriptions, job specifications, salary gradings, defined delegations, line of command, span of control and defined interrelationships. Yet this structure will have a different appearance depending on the level within the organisation from which it is viewed. Thus Brown recognises four different ways in which one organisation can be described: manifest, assumed, extant, and requisite.

Manifest

(a) this is the situation formally described as outlined in the previous paragraph;

Assumed

(b) this is the situation as it is assumed to be by an individual and which may or may not coincide with the manifest situation;

Extant

(c) this is the situation revealed by systematic exploration and analysis;

Requisite

(d) this is the situation as it would have to be to accord with the real properties of the field in which it exists. The ideal situation is that in which all four situations coincide.

4.6 Individuals or groups

Individuals

Structures tend to be thought of in terms of individual posts mainly because of the need to look closely at the work content and remuneration of each post. However, even if it is not explicitly recognised, much of the work in any organisation is done by groups, sometimes set up formally, at other times coming together informally to resolve a problem which involves the work of several sections or departments.

Groups

R Likert, in *New patterns of management* (McGraw-Hill), considers that an organisation 'will function best when its personnel function not as individuals but as members of highly effective work groups with high performance goals'. He advocates the building of the structure by deliberately creating such effective groups, and linking them into an overall organisation by means of people who hold overlapping group membership.

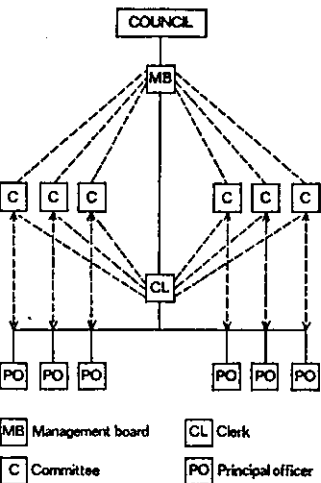
## 8.04(2) MANAGEMENT

### 4.7 Maud report

The factors which affect the departmental structure similarly affect the whole structure. Many local authorities in recent years have reviewed their structures, spurred on by the Maud Committee report — *Management in local government*.

The recommendations included analysis — 'a radical review of the respective functions and responsibilities of members and officers'; and the adoption of certain principles of management. These included:

- (a) clear division of work between members and officers;
- (b) officers to provide staff work for members;
- (c) delegation: decisions to be made at lowest proper level;
- (d) the number of committees should be drastically reduced: certain departments should be grouped under one senior principal officer;
- (e) the clerk to be head of the staff and principal officers to be responsible through him to council;
- (f) individual members of the management board should have special spheres of interest. The particular significance of the effectiveness of groups was not overlooked: 'the principal officers should work as members of a team of managers and specialist advisers, and see that



**Figure 2:**  
Maud's  
basic  
organisation

the same approach is adopted by their staff at all levels'. The basic organisation suggested by the report is shown in fig 2.

This organisation chart shows not only direct relationships, ie the line of command, which are shown by a solid line, but also indirect relationships, ie those of 'contact and advice', which are shown by dotted lines.

### 4.8 Wheatley report

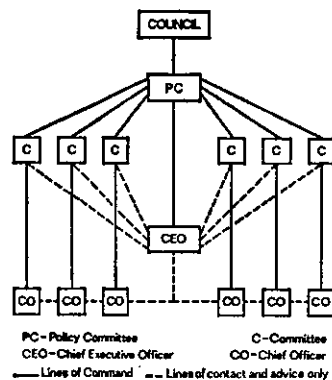
Disadvantages of 'Maud'-type organisation

The Royal Commission on Local Government in Scotland (the Wheatley report) pointed out that the 'Maud' type of structure has *inter alia* certain disadvantages; these are:

- it concentrates power into a few hands;
- it makes council membership less rewarding;
- it provides insufficient oversight of the work of officials;
- individual members of a small management board carry heavy responsibilities.

Alternative to 'Maud'-type organisation

Three alternatives incorporating a co-ordinating body were suggested: policy committee; management board (as advocated by Sir Andrew Wheatley in a note of reservation to the Maud



**Figure 3:**  
Wheatley's  
alternative

committee's report); and cabinet. All have advantages and disadvantages. The alternative including the policy committee is shown in fig 3. The line of command goes from the council through the policy committee to the executive committees and finally to the chief officers. The chief executive officer has a 'contact and advice' relationship only with the chief officers although his line of command emanates from the policy committee.

Disadvantages

This system was recognised as having two disadvantages:

Low efficiency

it would not provide conditions for the maximum efficiency or speed in reaching and executing decisions;

Integration

it would not achieve the same degree of integration of the administration as would be the case if chief officers formed a hierarchy under a chief executive officer.

Group action

The effectiveness of groups was emphasised in the Wheatley report too: 'Chief officers cannot afford to be merely narrow specialists: (they) must... regard (themselves) as forming part of a larger team under the chief executive officer, and be constantly aware of the links with other services and of the place which each takes in the work of the local authority as a whole'.

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CONTINUED ON DATA SHEET 8.04(3)

# A Municipal Engineering Data Sheet

# FILE REFERENCE 8.04(3) Structure

## MANAGEMENT

### 4.9 Coventry

Purpose	(i) J D Hender, chief executive and town clerk, states (see Bibliography): 'The whole purpose behind the development of the management system in Coventry is to assist the elected member to make the most effective policy decisions and to ensure the most efficient implementation of those decisions'.
Basis	(ii) The management system is based on a corporate approach, and it embraces the concepts of programme budgeting. It includes 'research, evaluation and advice on policy formulation, the allocation of resources and the implementation of plans and programmes'. The process involves elected members and officers working in close co-operation and is thus the concern of everyone in the local authority, not only of a selected few.
Aim	(iii) 'The aim of the system is to ensure that the whole organisation is working towards corporately agreed objectives in an efficient and effective way.' This requires
Commitment	(a) members and officers totally committed to corporate working;
Co-ordination	(b) Co-ordination between members and officers; between officers in different departments; and between those who make decisions and those who implement them.
The structure	(iv) The structure is shown in fig 4, the corporate organisation. At its head stands the city council, the policy committee (whose responsibility it is to advise the council on overall policy formulation and the level of future resources), and the service committees.
Chief officer team	(a) At the head of the officer organisation is the chief executive and town clerk and the team of chief officers.
Programme area teams	(b) There are nine programme area teams (see fig 4) which are grouped in relation to overall objectives, and which are responsible for advice to chief officers on policy formulation and resource allocation. They are inter-disciplinary, representatives for each team being drawn from the principal officers of the departments whose activities are covered by a team's objectives, and from other units concerned.
Control groups	(c) There are seven control groups (see fig 4) which are responsible for managing the implementation of the approved capital programme. These too are inter-disciplinary teams and are established to coincide with the main categories of capital schemes. Group leaders are drawn from senior officers in three departments: city engineer's, city architect and planning officer's, and associate town clerk's.
CPIG	(d) The capital programme implementation group (CPIG) co-ordinates control over the capital programme and the work of the programme area teams. It is composed of chief

ME data sheets 8.04(1) and 8.04(2) consider the basic requirements of structure: analysis, the principles to be incorporated in the management process, and relationships between posts, organisation charts, and the recommendations of the Maud committee and the Wheatley commission on the whole structure of a local authority. This sheet describes two such structures (Coventry and GLC) which have been evolved from traditional structures but which are quite different from them.

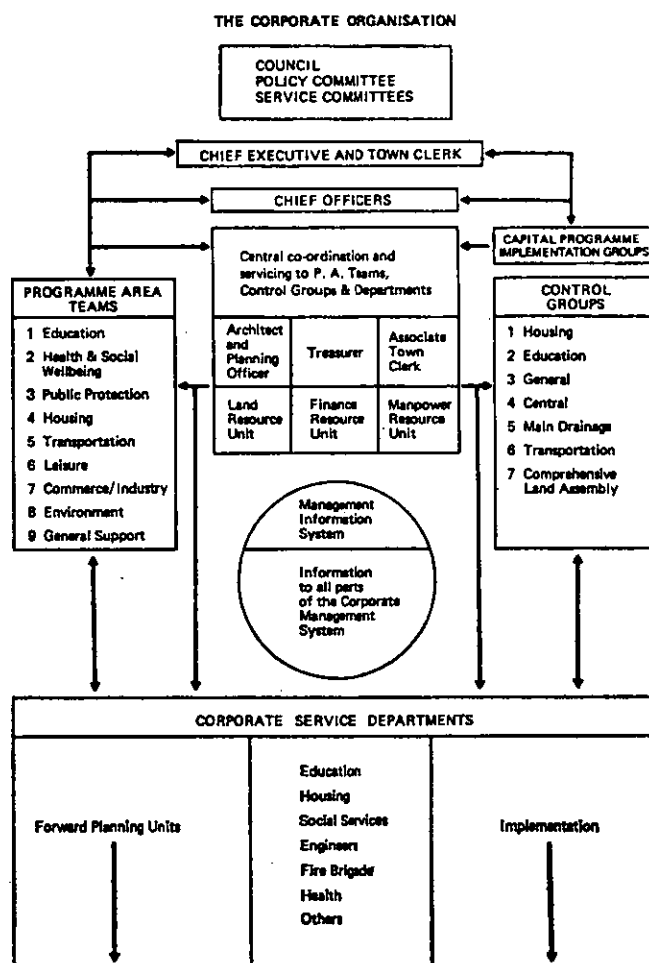


Figure 4: Coventry's corporate organisation

officers under the leadership of the chief executive and town clerk who meet daily informally, and weekly on a formal basis.

(e) The corporate organisation includes three resource units (see fig 4) — land, manpower, and finance — which advise the programme area teams, the control groups and departments on the short and long term availability of resources and their effect on implementation of the capital programme.

(f) Forward planning units have been established in the main departments together with officers in the smaller departments who have a particular responsibility for forward planning and information.

(v) A structure as complex as this could lead to rigidity in practice, and to avoid this happening Mr Hender states: '... there must be a degree of flexibility, for in no sense does the management system seek to impose a set of rigid rules to be followed regardless of circumstances'.

# 04(3) MANAGEMENT

## 10 Greater London Council

(i) Since 1968 three major changes have taken place; they involve the reorganisation of the committee system, modifications to the management structure, and the introduction of a planning—programme—budgeting system. Fig 5 illustrates the GLC's organisation for programme management showing the relationships between the council, committees, chief officers' board, programme boards and departments.

(a) The committee system includes the leader's co-ordinating committee, a policy and resources committee, a strategic planning committee, and 11 executive committees. In addition there is a committee for staff appeals, and sub-committees to deal with individual services.

(b) Highways and planning have been integrated under two joint directors and a post of controller of services has been established to co-ordinate the work of departments such as public health engineering, licensing, ambulance, fire brigade, parks and cultural activities.

(c) A board of nine chief officers has been set up consisting of the director-general, treasurer, director of establishments, architect, valuer and estate surveyor, director of housing, controller of services, and the joint directors of planning and transportation.

The board meets once per week, and among other things it resolves or clarifies differences that previously emerged at committee level as inter-departmental disputes.

(d) The GLC's work falls into five programme areas, each with its own 'programme board (see fig 5) composed of the heads or senior officers of the departments principally involved, together with representatives of the central departments and the programme office'.

The programme areas are: strategic planning, housing, transportation, health and safety, and arts and recreation.

(ii) A comprehensive planning—programming—budgeting system for managing the activities of the GLC as a whole has been developed. Its essential features are:

- (a) 'the clear definition of goals from the top downwards';
  - (b) 'the integration of long-term planning, medium-term action plans and yearly budgets';
  - (c) 'the development of relevant information for allocating resources and for controlling their use once allocated';
  - (d) 'the periodic, in-depth consideration of the various alternatives for reaching the council's objectives'.
- (iii) The main parts of this PPB system should be in being by 1 April 1973. These include:
- (a) '... an across-the-board programme structure in which all existing and proposed

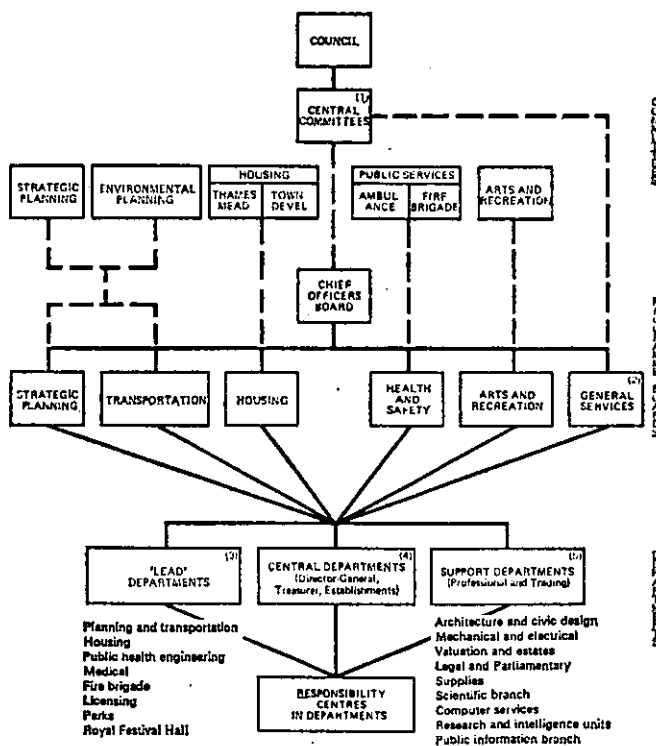


Figure 5: GLC's organisation for programme management, showing the relationships between the council, committees, chief officers' board, programme boards and departments

Notes: (Refer to numbers on the chart)

- (1) These are the leader's co-ordinating, policy and resources (also concerned with transportation through London Transport), finance and scrutiny, establishment, and general purposes committees.
- (2) There is no specific programme board for general services, which is controlled directly by the chief officers board.
- (3) Some of these also have central or support functions.
- (4) Some of these also have support functions.
- (5) Some of these also have central or lead functions.

activities are grouped into programmes classified according to their objectives'.

(b) 'a multi-year programme plan/budget showing not only costs (and revenues) for each programme over a five-year period, but (also) the output and the manpower and other resources required';

(c) 'formal arrangements for up-dating the programme plan/budget and for changing it to accommodate new proposals';

(d) 'formal arrangements for programme-review and programme analysis';

(e) the establishment of an information system, capable of providing 'both adequate data for planning and defining objectives, and for quantifying output and measuring a programme's impact'.

## ● Bibliography

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- Peterson, A W, Greater London Council, *Strategy for a metropolis*, one of eight articles in *Corporate management in the 70s*, a Municipal Journal publication.

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Most local authorities and their departments have had to absorb large amounts of new work over the years, and the organisation has been forced to adapt itself to the additional work load. The writer would think it rare for a department to have thought its structure through, and certainly not by systematic analysis as outlined in these sheets.

Published staff charts are similar to that of Torbay, and tell very little. It is doubtful if any department, even one having job descriptions, has an explicit statement of relationships between posts. Yet problems are continually met with which demand that these relationships are defined.

One difficulty here is that a really good post-holder will change its role and content.

Reorganisation will mean that structure will have to be thought about very carefully where, for example, several small authorities are coming together to form one large one. Job descriptions and role relationships will surely need to be much more carefully defined than hitherto, if the system is to work. It will be interesting to see how many of the new District Councils have actually consciously thought their new structures through, before appointing staff. (N.B. Vide the writer's paper, "Management Organisation in a District Council's technical services department", presented to the PTRC Summer annual meeting, University of Warwick, July 1974).

At member level the whole thing becomes more complicated, because of their variable educational and personal abilities. Many members seem to be only interested in complaints from residents. To set up a structure for them on Maud or Wheatley lines would leave them without the role at the top.

The structure at the top must therefore continue the half fiction that only members form the policy formulation body. Members will of course continue to make the final decisions on policy matters.

# MANAGEMENT

## FILE REFERENCE 8.04(4) Structure

*This sheet gives details of the recommendations on structure made by the Bains report. The new local authorities, management and structure (HMSO), which seeks to extend the corporate approach to all the new authorities to be set up in 1973.*

### 4.11 Bains' main principles

There are eight main principles on which the report is founded, and summarised these are:

**Roles** (a) There must be clear understanding by members and officers of their respective roles so that they can forge an effective partnership.

**Role satisfaction** (b) The management structure should enable every member to find satisfaction in fulfilling his particular desires.

**Checking results** (c) Monitoring and reviewing performance is an activity of the greatest importance.

**Delegation** (d) All decisions should be taken at the lowest practicable level, and there must be full acceptance of the principles of delegation to officers.

**Corporate approach** (e) The ingrained departmental approach to management is no longer appropriate. Local authorities are urged to adopt a corporate approach so as to ensure that their resources are most effectively deployed.

**Policy and resources** (f) There should be a policy and resources committee which would aid the authority in setting objectives and priorities, co-ordinating and controlling the implementation of those objectives, and monitoring and reviewing performance.

**Chief executive** (g) Each authority should appoint a chief executive who should have outstanding managerial ability and personality.

**Manpower** (h) Manpower is a leading resource of any authority and must be properly deployed. The appointment of a senior officer responsible for personnel management is crucial. The report points out that it is the process of local government management that needs to be changed and that changing the structure will not necessarily achieve that result though it may well facilitate it.

### 4.12 Policy and Resources committee

**Major resources** This committee, which is central to the new structure, would have ultimate responsibility for the major resources of the authority — ie finance, manpower, and land (including buildings). It would be supported by four sub-committees: one for each of the three major resources and which should deal only with matters of major importance; and one for monitoring and reviewing performance. This sub-committee would be capable of undertaking a detailed investigation into any project or department, the general responsibility for the regular monitoring and review of performance being carried out by the respective programme committee.

### 4.13 Grouping services and functions

**Few committees** There is no ideal number of committees but basic management principles suggest four rather than 14. Grouping of services and functions is therefore desirable.

**Programme areas** The report advocates a committee structure based on programme areas linked to the authority's main needs and objectives because this encourages a corporate rather than a departmental approach. Each programme area committee would be able to call on, and be serviced by, the skills and experience of different departments.

### 4.14 Departments

**Professional base** Any new structure should be built on the existing professional base. Heads of departments must retain responsibility for the effective and efficient running of the services for which they are responsible. It is neither necessary nor desirable for the committee and the departmental structure to coincide.

### 4.15 Management team

**Six** A small management team of about six chief officers led by a chief executive who has no departmental responsibility is needed in each authority.

**Corporate role** The management team, made up of principal chief officers, would have a corporate identity and play a positive role in the corporate management of the authority. Its members would not act primarily as representatives of their own departments.

### 4.16 Possible management structures

These structures, which are all described as 'possible', include only major functions. Minor departments would generally be placed under the general administrative umbrella of a major department.

### NON-METROPOLITAN COUNTY

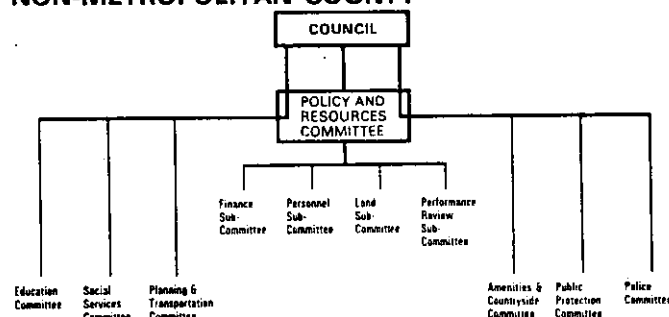
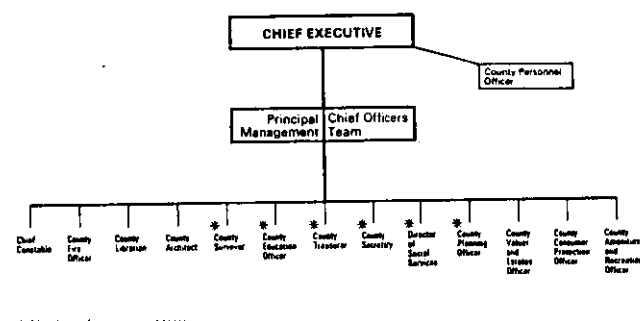
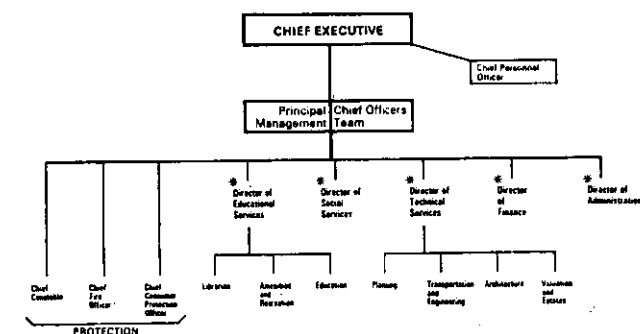


Figure 6: committee structure



\* Members of management team

Figure 7: departmental structure 'A'. This is no more than an array of possible departments.



\* Members of management team

Figure 8: departmental structure 'B', an alternative departmental structure incorporating grouped functions within directorates. Such groupings should be logical ones and lead to full integration of formerly separate departments.

### NON-METROPOLITAN DISTRICT

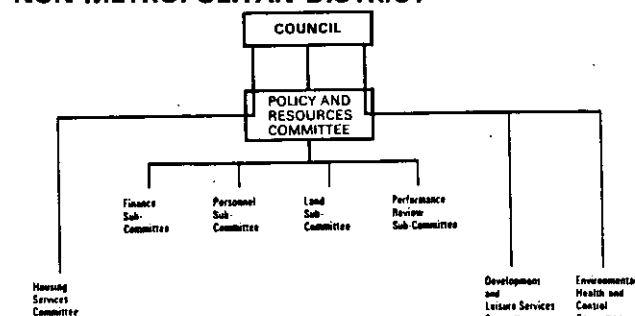


Figure 9: committee structure 'A'. This is a structure based on three programme committees. The environmental committee would include highways and drainage.



# 8.04(4) MANAGEMENT

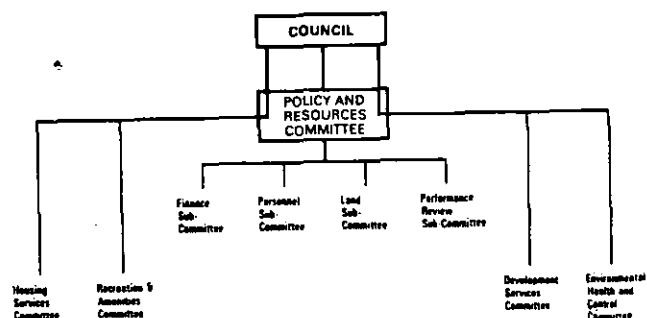


Figure 10: committee structure 'B', an alternative structure based on four programme committees. The development committee would lose leisure services and gain highways.

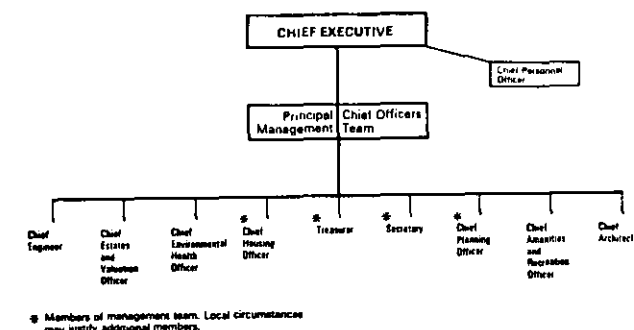


Figure 11: departmental structure — larger districts

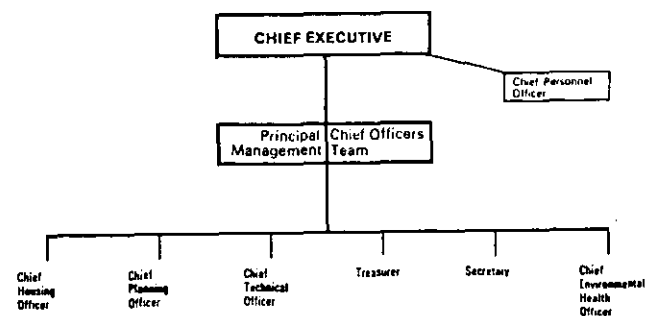


Figure 12: departmental structure — average districts. An alternative departmental structure for medium and smaller districts incorporating a chief technical officer responsible for all design and construction work.

## METROPOLITAN COUNTY

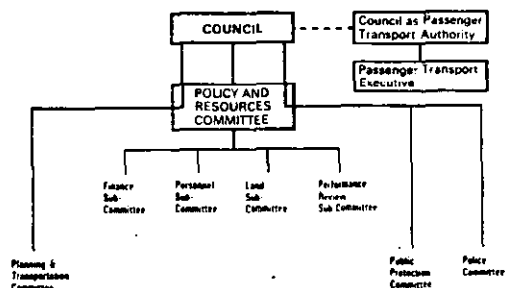


Figure 13: committee structure. Having few statutory functions, the structure can be simple.

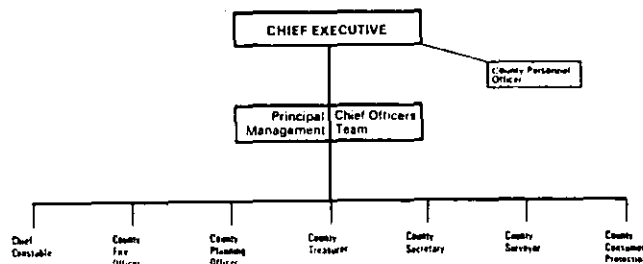


Figure 14: departmental structure. The members of the management team would be the planning officer, treasurer, secretary and surveyor, but all chief officers could be members as there are so few of them.

## METROPOLITAN DISTRICT

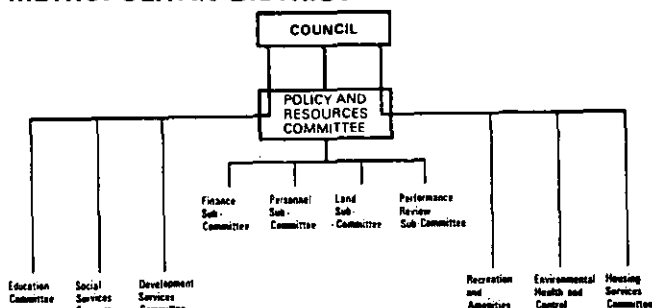


Figure 15: committee structure. The development services committee includes highways.

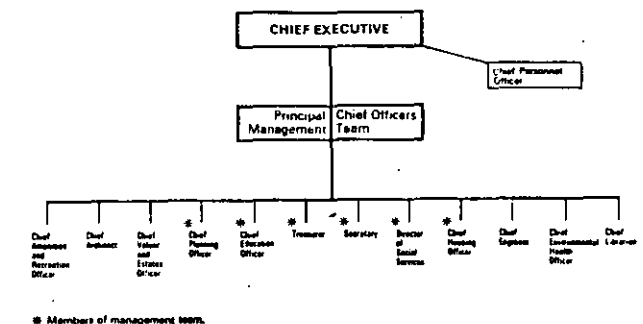


Figure 16: departmental structure 'A'

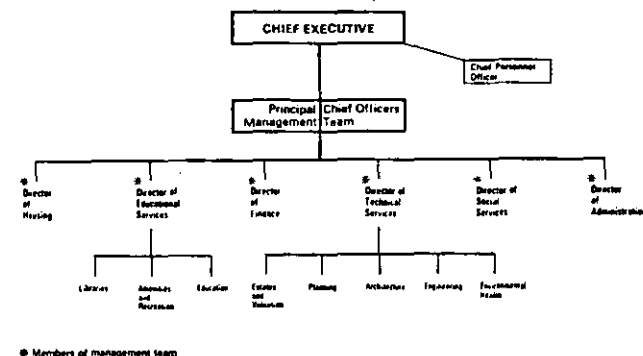


Figure 17: departmental structure 'B', an alternative structure incorporating grouped functions within directorates.

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# A Municipal Engineering Data Sheet

Data Sheet 8.04 (4) Structure. Commentary

This sheet deals only with the structure aspects of the Bains report. The report is in some ways rather superficial in that it assumes for example that readers know what is meant by corporate management. Nevertheless, it is a good step forward in the evolutionary process of management in local government. Full benefit will only be derived from it if enough local government officers have a good background in general management knowledge.

One major defect in the structure is that it is proposed to have a management team of principal officers, the other chief officers being brought in for discussion as necessary. Thus in the suggested structure for a non-metropolitan county there are more chief officers outside the management team than inside it. There is no discussion in the report of the way in which this kind of set-up can be welded into corporate management.

No doubt the programme area concept which is central to the report's philosophy would help, but there is nevertheless likely to be a strong tendency for the excluded chief officers to attempt to be independent.

It is unfortunate that the Bains working group contained only clerks and treasurers because for this reason alone it will be less acceptable to the other major professions than it would have been had they been represented on it.

MANAGEMENT

FILE REFERENCE 8.04(5)  
Structure

*The Bains report related to management and structure of local authorities in England and Wales. The Paterson report, The new Scottish local authorities organisation and management structures (HMSO, 1973) is the analogous manual for Scotland. This sheet sets out the structures recommended in the report, and the principles considered to be basic elements in all those structures however much they may vary in detail.*

4.17 Paterson's main principles

	These are described as the cornerstones of the new structures, and summarised they are:
Corporate approach	(a) There is a need for a corporate approach not only within a single authority, but between authorities, and with central government.
Council supremacy	(b) The council is the body in which the authority's broad policy objectives and the major commitment of resources should be fully discussed and decided. The power of decision-making must in the end remain with the council.
Delegation	(c) There should be greater devolution of decision-making; issues should be dealt with at the lowest level consistent with the nature of the problem.
Participation	(d) The local councillor should be invited to participate in committee discussions where issues of particular concern to his constituency are under consideration.
Policy and resources committee	(e) All but the smallest authorities should have a policy and resources committee consisting of between 8 and 15 members depending on the size of the council. It should be responsible for identifying and setting out for consideration by the whole council, the fundamental objectives which the council should be aiming to achieve, charting the broad course to be followed and setting the policy guidelines. It should co-ordinate the activities of other committees, and monitor and review the performance of service committees and departments. A majority of its members should be the acknowledged leaders and opinion formers.

Committee role	(f) The service committees should be responsible for policy formulation and implementation in their own particular spheres of interest within the framework of an overall policy plan.
Advice to party groups	(g) Effective arrangements need to be made for the provision of officer advice to the party groups prior to decisions being taken.
Management team	(h) It is necessary to have a cohesive team of officers having an acknowledged leader working to a common set of objectives. The role of the management team is to give co-ordinated advice on policies and major programmes of work.
Chief executive	(i) There should be a chief executive as head of the authority's paid service, accountable to the council for the provision of co-ordinated advice and the effective implementation of agreed policies and plans. He should have direct authority over and responsibility for all other officers except where they are carrying out statutory duties or are exercising their professional judgment.
The executive office	(j) The chief executive should not have direct responsibility for a major department of the traditional type except in the smaller authorities. However, in the larger authorities he will need a substantial degree of support and this will come from the 'executive office' which will consist of the director of finance, a director of administration, and in the largest authorities of all, a director of policy planning who would be responsible for the policy planning unit, research and intelligence, and programme area team co-ordination. These officers could be designated as deputy chief executives.

## DISTRICTS

parate structures are shown for large and small districts (population range 1,147,000 to 9,000), but no classification of authorities to one or other category is made. The proposed structures are guidelines which can be adapted in the light of particular local circumstances.

### ) Large

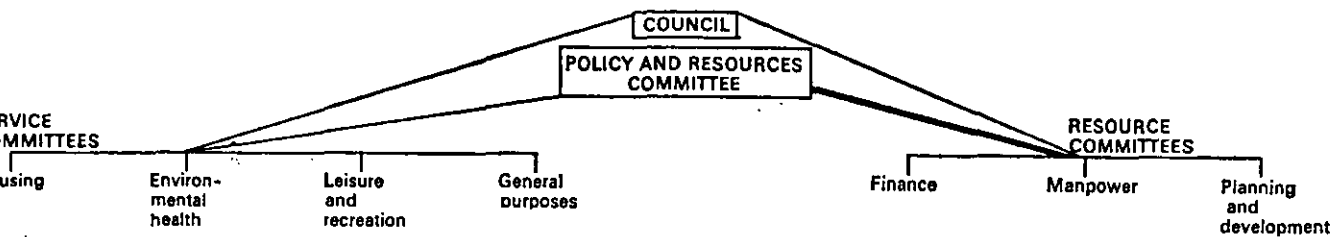
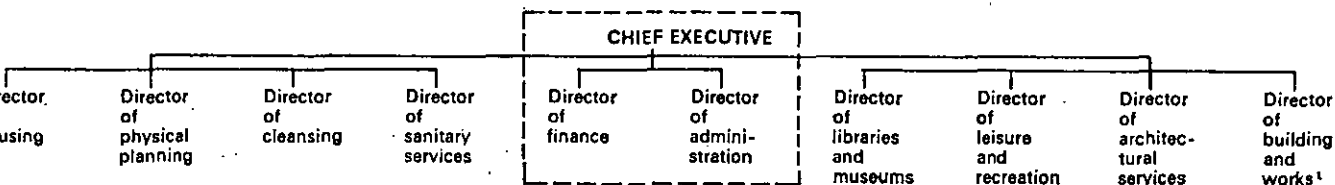


Figure 6: Committee structure



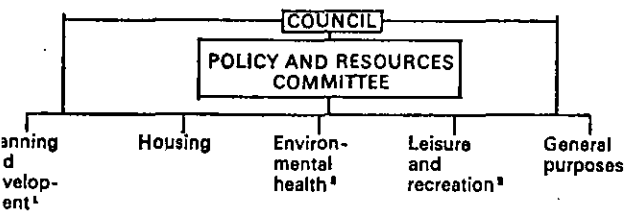
----- the executive office

Dependent on existence and scale of direct works departments

Figure 7: Officer structure

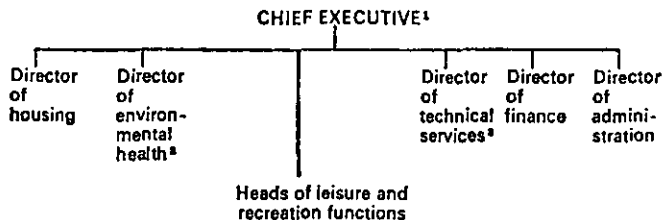
### ) Small

the smallest districts the council itself would perform the role of the policy and resources committee.



except in districts within general planning authorities.  
in the smallest districts environmental health and leisure and recreation could be combined.

Figure 8: Committee structure



<sup>1</sup> Will probably have direct responsibility as a director of one of the main departments.

<sup>2</sup> Responsible for cleansing and sanitary services.

<sup>3</sup> Responsible for architecture, direct works and, where applicable, physical planning and building control.

Figure 9: Officer structure

# REGIONS

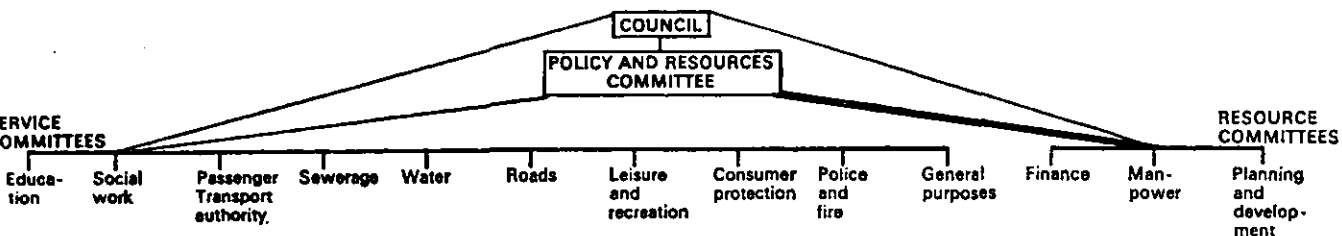


Figure 1: Committee structure applicable to Strathclyde, population 2,578,000

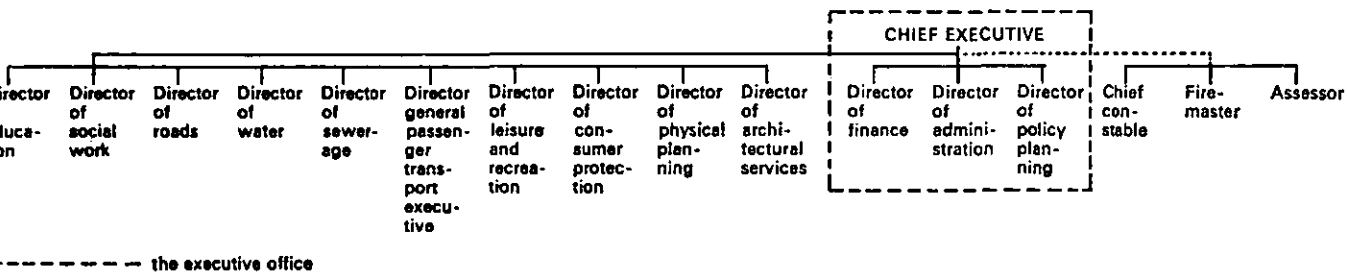


Figure 2: Officer structure applicable to Strathclyde

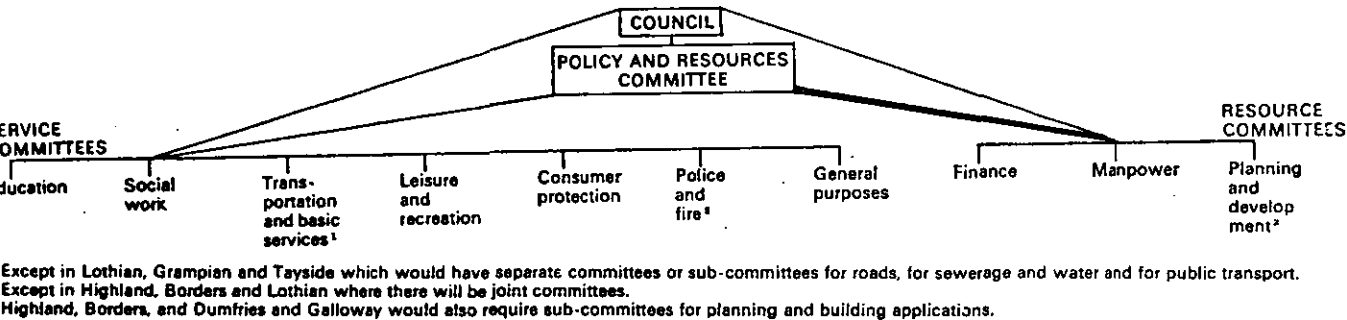


Figure 3: Committee structure applicable to Borders (99,000), Central (263,000), Dumfries and Galloway (143,000), Fife (328,000), Grampian (437,000), Highland (175,000), Lothian (742,000) and Tayside (397,000). Estimated populations are in brackets

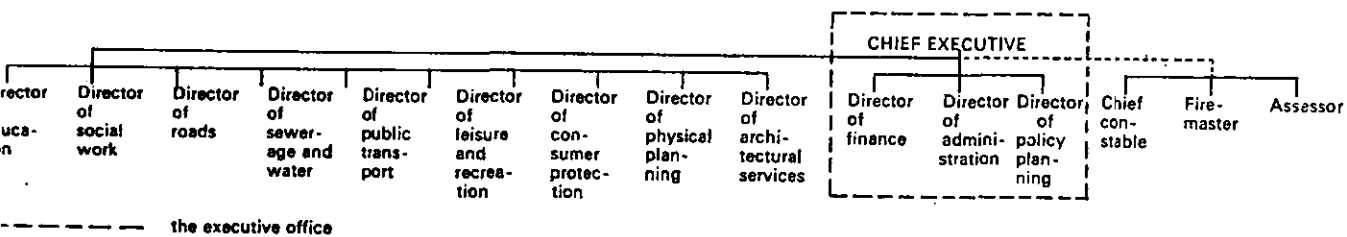


Figure 4: Officer structure applicable to Grampian, Lothian, and Tayside

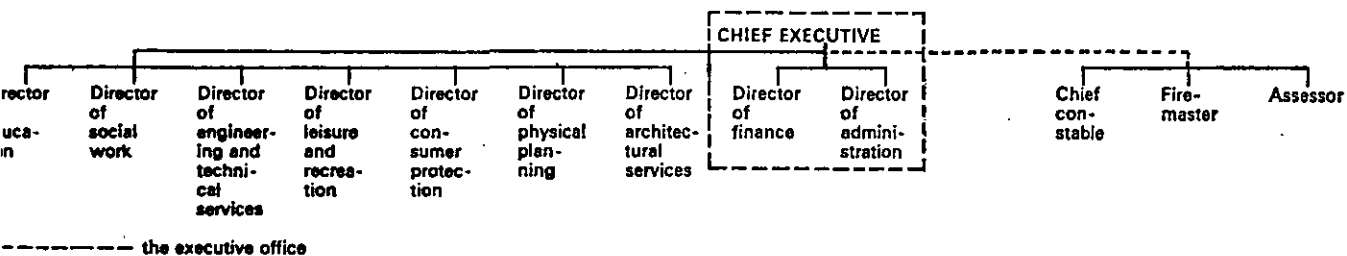
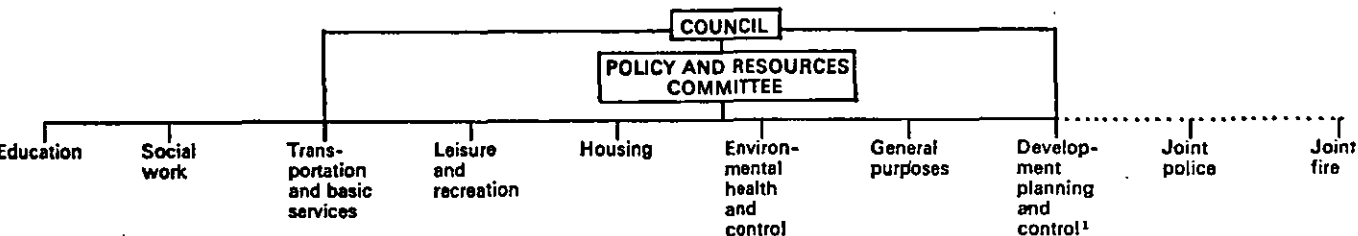


Figure 5: Officer structure applicable to Borders, Central, Dumfries and Galloway, Fife, and Highland

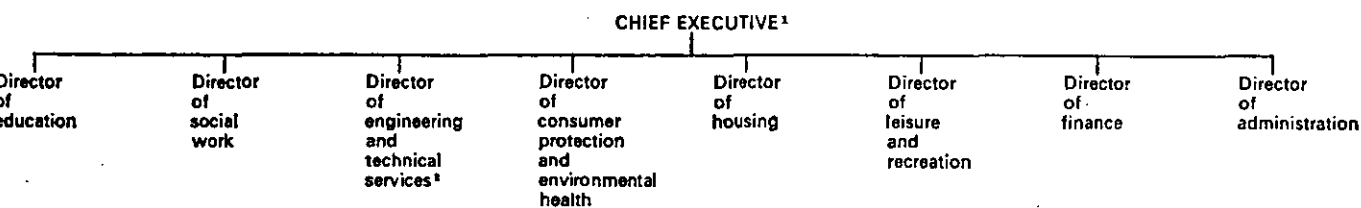
## ISLANDS

These are most-purpose authorities whose population range is 31,000 to 17,000.



<sup>1</sup> In Orkney and Shetland.

Figure 10: Committee structure



<sup>1</sup> Will probably have direct responsibility as a director of one of the main departments.

<sup>2</sup> A separate director of physical planning may be required in Orkney and Shetland

Figure 11: Officer structure

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## A Municipal Engineering Data Sheet

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Data Sheet 8.04 (5) Structure. Commentary

There are criticisms of two kinds of this report: one that it is badly written, and two that its recommendations are unsound.

Dealing with the first criticism, the report is a jumble; related matters are scattered throughout the report and the whole thing gives the impression of having been pieced together. In places, it is contradictory. A good example of jumble is the chapter on 'cornerstones', on which this sheet is based. It is very difficult to identify these cornerstones in the text and the writer's list given in the sheet may be different from other people's lists.

So far as the recommendations are concerned, the most controversial is the setting up of an 'executive office' which will cause much dissent among the professions not admitted to that select group. For other criticisms, see Local government studies, February 1974 (leading article), and ME, 12.10.73, page 2253.

# MANAGEMENT

## FILE REFERENCE 8.05 Authority

Each person exercising an executive function requires authority to do so; whence is this authority derived, how is it exercised and what constraints are placed on it? This data sheet examines some of the more important answers that have been given to these questions.

### ●AUTHORITY

Authority is defined by Wilfred Brown in *Organisation* (Heinemann 1971) as 'the quality of a role (or a group of roles) that sanctions the incumbent to act within defined limits.'

#### 5.1 Max Weber

**Types** (i) **Legitimate authority:** Max Weber (*data sheets 8.01 and 8.02*) was a scholar whose particular interest was formal organisations, including bureaucracy. In *The theory of social and economic organisation* (The Free Press) he distinguished three basic types of legitimate authority which corresponded to his own three basic types of organisation. Thus authority is based either on rational grounds, traditional grounds, or charismatic grounds:

**Rational** (a) authority rests on the legality of rules, and on the right of people promoted to positions of authority under those rules to issue commands. Obedience is owed to the organisation which is impersonal. People exercising authority do so only within the limits of the formal authority given to them, and are obeyed only because of that authority. This is the basic bureaucratic position and corresponds closely to that in local government;

**Traditional** (b) authority rests on the established belief in time-honoured traditions, and the legitimacy of the status of people exercising authority within them. Obedience derives from the personal loyalty which is owed to the person who occupies the position of authority;

**Charismatic** (c) authority rests on the devotion of followers to an individual person of exceptional sanctity or character, and in the belief of his right to set standards or issue instructions etc. Obedience is given to the leader by virtue of his qualities and the personal trust that his followers feel in him. Weber points out that these types or qualities are not mutually exclusive.

(ii) **Authority in bureaucracies:** Weber stated that there is in a bureaucracy a specified sphere of competence for each office or unit. This involves:

**Sphere** (a) a sphere of duties which has been defined as part of the systematic division of labour in the organisation;

**Authority** (b) the office-holder being provided with the necessary authority to carry out the specified duties;

**Compulsion** (c) the definition of the means of compulsion and any limitations on its use. He noted however that units having these characteristics do not necessarily have powers of compulsion. Thus he distinguishes between authority, by which instructions are obeyed without compulsion, and power, which is supported by compulsion.

#### 5.2 Henri Fayol

**Types** **Managerial authority:** Fayol recognised that the authority exercised by every manager, which he defines as 'the right to give orders and the power to exact obedience,' was composed of two parts — impersonal (*ex officio*) and personal (*data sheet 8.03*):

**Impersonal** (a) impersonal authority is derived from the office or post itself;

**Personal** (b) personal authority is derived from the personal qualities of the manager — intelligence, experience, moral worth, ability to lead etc. Personal authority is the indispensable complement of official authority in good managers.

#### 5.3 C I Barnard

**Types** (i) **Personal and post-holding authority:** Barnard takes a perceptive view of authority and in *The functions of the executive* (Harvard University Press 1938) he sets out two aspects of authority: subjective and objective. He defines authority as 'the character of a communication (order) in a formal organisation by virtue of which it is accepted (by the recipient) as governing the action he contributes . . .' This means that orders and instructions will be obeyed only if the recipient himself acknowledges that the person giving those orders or instructions has the necessary authority to do so.

**Acceptance by recipient** (a) **Subjective:** This is the personal aspect of authority; the acceptance by the recipient of an order as authoritative. If an order is 'accepted' by the recipient, this confirms its authority, and it will be acted upon. Therefore in this context the person who decides whether an order has authority or not is the recipient, not the giver of the order. Thus, in such cases authority is not derived from the office or post.

**Conditions for acceptance** Barnard states that a person can and will accept a communication as authoritative, only when four conditions simultaneously exist:

he can and does understand the communication;  
at the time of his decision he believes that it is not inconsistent with the purpose of the organisation;

at the time of his decision he believes it to be compatible with his personal interest as a whole;  
he is able mentally and physically to comply with it.

The success of an organisation depends partly on the carrying out of orders and since employees have an interest in its success, they are influenced to obey orders unless they are entirely unacceptable.

(b) **Objective:** This is 'the character in the communication by virtue of which it is accepted.' The maintenance of objective authority depends on the operation of the system of communication



	in the organisation. It is derived from two sources: position, and personal qualities.
Position	Authority of position is derived from the office or post, because people impute authority to orders from superior posts; it is largely independent of the personal abilities of the office-holder.
Personal qualities	Authority of leadership stems from the personal qualities and superior abilities possessed by some people. Other people impute authority to what is said because of those personal qualities.
Coercion	(ii) <b>Application of authority:</b> To sum up, Barnard's view is that 'Authority lies always with him to whom it applies. Coercion creates a contrary illusion; but the use of force <i>ipso facto</i> destroys the authority postulated'.
Co-operation	'Authority is another name for the willingness and capacity of individuals to submit to the necessities of co-operative systems.'
Paradox	How is this apparent paradox resolved? Barnard says: orders are not issued that cannot or will not be obeyed, because to do so would destroy authority, discipline, and morale. Rosemary Stewart in <i>The reality of management</i> (Pan Piper 1967) says 'A wise manager knows the limits of his own authority and, as far as possible, avoids weakening his authority by trying to exercise it where it is likely to be challenged or ignored.' Similar views were expressed by Mary Parker Follett in 1925 in <i>The giving of orders</i> , later published in <i>Dynamic administration</i> (Harper).

#### 5.4 Chief officer's authority

Sources	(i) Authority is conferred by statute on councils and in some cases directly to officers. It is also conferred on officers by decisions of councils or their committees, by conditions of service, and by qualifications and experience.
Executive head	(ii) For example the general conditions of service of the joint negotiating committee for chief officers (JNC) state that 'a chief officer shall be the executive and administrative head of the department of which he is chief officer. He shall be responsible therefor to the council through the appropriate committees.'
Personal	(iii) A chief officer's professional qualifications, personal qualities and experience will determine the extent of his 'personal' authority as defined by Fayol.

#### 5.5 Authority and responsibility

Inseparable	(i) Important management writers — eg Fayol, Taylor and Urwick — believe that authority and responsibility are inseparable. 'Responsibility is the corollary of authority and wherever authority is exercised, responsibility lies.'
Responsibility eschewed	(ii) In Fayol's view it is relatively easy to establish a manual worker's responsibility, but at higher levels in an organisation, as work becomes more complex, and many more people are involved, it becomes very difficult to establish the degree of responsibility of each person. He said that while authority is much sought after, the opposite applies to responsibility.
Accountability	(iii) Taylor said that it was essential for the conception of authority and responsibility to correspond. Any individual or group to whom is assigned authority for which he is or they are not held accountable to someone will tend to exercise that authority with decreasing effectiveness.

#### 5.6 Why rules are obeyed

Professor P H Nowell-Smith in *Ethics*

(Pelican 1954) considers why a man obeys a rule on a particular occasion, and says that when the explanation is given in terms of motives, the motive may be one of the following kinds:

Rationality	(a) the rule may seem to him to be the best, simplest and most convenient way of achieving whatever it is he wants to achieve;
Penalty	(b) the rule may be supported by a sanction and he is afraid of the consequences of breaking it;
Conformity	(c) he may desire to obey the rule simply to conform to the code in use in his society. This is an exceedingly common motive;
Duty	(d) he may obey the rule for its own sake, and if the rule is a moral one, this motive is called a sense of duty.

These possible explanations are not mutually exclusive according to Professor Nowell-Smith. Although they are general explanations, dealing with society as a whole, they support the views of Barnard and Follett on authority.

#### 5.7 Sanctions

	(i) The exercise of authority is supported by the threat of the use of sanctions if necessary. What are these sanctions and how effective are they?
Application	Fayol said that the application of sanctions to acts of authority forms part of the conditions essential to good management, but it is generally difficult to effect, especially in large concerns. This arises in part at least because the complexity of large organisations is such that important decisions are rarely the responsibility of one person alone.
Purple Book	(ii) The <i>scheme of conditions of service</i> (paragraph 71, Discipline and efficiency) states that 'The chief officer of each department shall be responsible for the management and discipline of his department. A chief officer may suspend any member of his staff for gross misconduct . . .'. An officer shall be informed in writing of any proposal by a committee or chief officer to relegate or dismiss him, and the reasons for it. The officer may appeal. The general exercise of authority cannot rest on the use of sanctions; indeed if it becomes necessary to use sanctions it is clear that the post-holder is not suited to the post, and it were better that a more suitable role were found for him than that sanctions be applied.

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The views of Barnard and Follett on authority have been known since the late thirties, yet people promoted to a position of seniority even now often have to find out by trial and error that it is only possible to issue instructions that will be followed. In practice it is probably better not to issue instructions at all, but rather to lead subordinates to arrive at the desired conclusions themselves when one can be sure that the work will then be done in the desired manner.

The local authority position is somewhat confused; e.g. if the council's job is to make policy, and the officer's job is to carry it out, who ought to have authority over appointment, promotion, and dismissal? So far as these matters relate to staff, that authority often lies with the members acting collectively in committee or council. Since a committee can override a chief officer in these matters, is this not inconsistent with his stated responsibility to be the 'executive and administrative head of his department'? The writer suggests that it is. Does it lead to retaining ineffective officers in positions which do not suit their particular talents? The writer suggests that it does.

Can a chief officer be held responsible as stated for his department if he does not have authority over appointment, promotion, and dismissal? The writer suggests that he cannot. Is it really possible for the clerk to have as stated 'authority over all other heads of departments' in certain respects only. The writer suggests that authority cannot be qualified in this way. The question of whether authority and responsibility are inseparable or not will be discussed in later sheets.

# MANAGEMENT

## FILE REFERENCE 8.06 Corporate management

'The New Local Authorities, Management and Structure' (HMSO) 1972 (*the Bains report*) states that the ingrained departmental approach to management is no longer appropriate and urges local authorities to adopt a corporate approach to their affairs (see data sheet 8.04(4):4.11). The terms 'corporate planning' and 'corporate management' are variously used by management thinkers and writers. This data sheet seeks to define these terms, and to examine the effect of adopting a corporate approach in the new local authorities.

### ● CORPORATE MANAGEMENT

#### 6.1 The traditional approach

**Disunity** The Maud committee report *Management of local government* stated that there was a long tradition of associating a particular committee with a specific service, a practice which was hardened by the requirement of statutes that for certain services, specific committees should be set up. 'There exists therefore in local authorities in this country an organisation which is based on separate parts in each of which there is gathered the individual service with its professional departmental hierarchy led by a principal officer and, supervising it, a committee of members. There may be unity in the parts, but there is disunity in the whole.'

**Departmentalism** This departmentalism is emphasised by the status clause of the general conditions of service of the designated chief officers (*Recommendations of the joint negotiating committee for chief officers, schedule 11, July 1970*) which states that 'a chief officer shall be the executive and administrative head of the department of which he is the chief officer. He shall be responsible therefore to the council through the appropriate committees.'

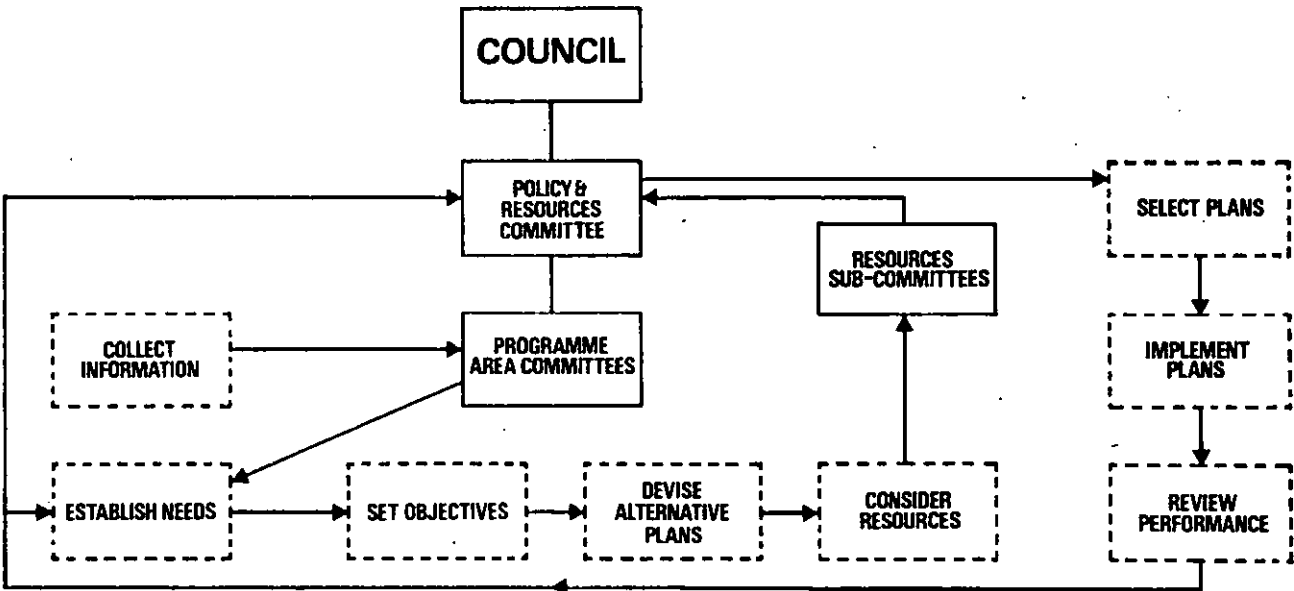
Separatism/  
conflict

Rivalry

the Maud committee thought these would increase still further, thus making co-ordination of an authority's plans and their execution more difficult. Traditionally each chief officer has been responsible for devising schemes within the purview of his department, and although there has been a high degree of co-operation between departments in some local authorities, in others some committees and departments have pursued policies without regard to the needs of the community as a whole. Thus conflicting policies may have been pursued by different departments of the same authority at the same time. There has been rivalry between committees and between departments for greater expenditure, larger establishments, and extra responsibilities that tends to induce an introverted approach to the discharge of departmental duties. The Maud report said that many service departments are closely connected: 'Planning for the development of the community, the allocation of priorities for finance or for space on the drawing board, the timing of the various schemes, all demand a co-ordinated approach'.

#### 6.2 The need for change

**Proliferation of departments** There has been a tendency for the number of local authority functions, with their associated departments and 'professions', to increase;



Corporate management flow diagram

6.3 The corporate approach

Internal/  
external  
relations

Corporate  
management

Corporate  
responsibility

Corporate  
planning

PPBS

Committee  
structure

Management  
team

The Bains concept of the corporate approach is a wide one; it embraces not only the internal organisation of the authority itself (involving both elected members and officers), but also the relationship with other local authorities and statutory organisations.

(i) Corporate management may be defined as the process by which elected members and officers jointly establish the needs of their community, devise plans for satisfying those needs, and arrange for the plans to be implemented.

The Bains report states that 'corporate management is not something which is done behind closed doors in a policy meeting; it is a process involving every member and many officers'.

Corporate management goes further than mere joint action; if it is to make a significant difference to local government management it must include a measure of corporate responsibility 'in which chief officers accept responsibility for the affairs of the authority over and above their responsibility for a particular service or department' — J D Stewart, *Management in local government: a viewpoint* (Charles Knight, 1971).

(ii) Corporate planning is one of the activities which will form part of the corporate management process. It has been defined (INLOGOV internal papers) as 'a systematic approach to strategic decision-making'. The Bains report says that corporate planning will assist, for example, in setting departmental objectives, in identifying community needs, and in devising measures of output and performance. The report suggests that a corporate planning unit should be set up 'to plan ahead on an authority-wide basis'. Its function would be 'to formulate objectives, evaluate alternative methods of achieving those objectives and measure the effectiveness of ultimate performance against those objectives'. A framework for carrying out this function could be provided by a planning, programming and budgeting system.

(iii) The introduction of corporate management into a local authority will substantially affect the committee structure. The structures suggested in the Bains report for each type of new council incorporate a policy and resources committee, and in every case it is supported by four sub-committees — finance, manpower, land, and performance review (see data sheet 8.04(4).4.16). To encourage a corporate approach in the other committees, the Bains report suggests that they should each be responsible for a programme area — eg highways, planning and transportation — rather than for a single function, eg highways. This is similar to the GLC and Coventry approach to structure (see data sheet 8.04(3)).

(iv) The introduction of corporate management will alter substantially the traditional role of chief officers. The two main changes will be the appointment of a chief executive who would have 'authority over all other chief officers so far as this was necessary for the efficient management and execution of the council's functions' (Bains), and the establishment of a management team in which each chief officer would expand his

Subordinate  
chief officers

Programme  
area teams

6.4 Disadvantages

New attitudes

Private sector  
experience

Group  
management

Free discussion

Conservatism

Accountability

responsibility from a departmental one to a corporate one, thus sharing overall responsibility for the team's decisions. The Bains report envisages that the management team would be the counterpart, at officer level, of the policy and resources committee.

(v) At lower levels, the effect of introducing a corporate approach would be to set up inter-disciplinary teams, possibly on a programme area basis.

In solving some problems (rigid departmentalism, co-ordination difficulties), others may be created. For example, new attitudes will be required in elected members and chief officers in particular since certain responsibilities would be given up, and others taken on. Chief officers seem unlikely to be accorded the degree of independence they have hitherto enjoyed, and the quality of the service may suffer thereby.

Similar methods when adopted in the private sector have had certain disadvantages. Some of the possible difficulties are outlined by Dr Ernest Dale in *Management: theory and practice* (second edition, McGraw-Hill 1969) from which the following extracts are taken:

'In group decision making, some top executives may be freed from work on day-to-day operations to devote themselves entirely to overall problems, or at least spend only part of their time on their functional responsibilities. Such a body may confine itself to overall issues involved in planning, organisation, and control, or it may also deal with specific functional issues.'

'The basic advantage of such a system is that it brings more than one mind to bear on the most important problems of the corporation. And, since the members of the group are on a more or less equal footing, there can be more freedom of discussion than is likely between a superior and his subordinates.'

'On the other hand, a group is likely to be more conservative since one or two of its members may object to almost any new idea on one ground or another.'

'The degree of success possible seems to depend largely on the personalities of those making up the group.'

'Group management also blurs accountability because there is no one person who can be held responsible for success or failure. The result may be confusion, a multiplication of red tape, and eventual stagnation.'

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A Municipal Engineering Data Sheet

The most striking thing about this subject is that the writer was unable to find any reference to it at all in any of the literature in the Loughborough University library or in the Trent Polytechnic library. There are numerous books on corporate planning, which can be approximately equated to local government's PPBS, but this is, as is explained in the Sheet, only part of corporate management. The nearest the writer could get to it in private sector management was in Dale's 'group decision making' which is quoted in the Sheet.

It may of course be that the philosophy of corporate management, which has just been discovered in the public sector, has always existed in the private sector and to such an extent that it is assumed that all businesses, except the one-man sized businesses, are run on corporate management lines. There would thus be no need to formally state that it was so, and this has only become necessary in the public sector because that has hitherto been run deliberately and knowingly (and for good reasons of independence) on departmental lines.

Unfortunately, although Bains says much about corporate management, he has failed to define it, and in 7.3 (i) the writer has made an attempt at a definition.

Curiously Dale states as one of the disadvantages of group working that groups tend to be conservative since one or two members may object to almost any new idea.

There are two points in that observation that call for comment. First the writer believes that on the whole groups tend to be radical rather than conservative since members generally do not wish to be thought old-fashioned or weak, and can always hide behind a collective decision. Second, if a group is to work satisfactorily, the majority view must have precedence and therefore one or two dissident voices would be insufficient to hold back a

group from adopting new ideas.

His statement that the group working blurs accountability sounds odd, since in any enterprise it is almost impossible to hold any one person accountable for an action; numerous people are involved in any decision or activity.

MANAGEMENT

FILE REFERENCE 8.07  
Delegation

Management is the process of getting things done through other people (see data sheet 8.01). 'Throughout this process there are innumerable decisions to be taken at various levels of responsibility', said the Committee on the Staffing of Local Government (Malleby). Taking these decisions and implementing them involves delegation. What authority does delegation convey to a subordinate; should his powers be circumscribed, and if so in what manner; who is responsible for the consequences of action taken under delegation? These questions, vital to an understanding of the functioning of delegation, are discussed below.

DELEGATION

7.1 The need to delegate

Definition	Delegation is the act of giving authority and responsibility to a subordinate to make decisions and take action (including delegating some of his work) within the superior's overall command.
Manner	It can be done on a positive basis by which a superior delegates everything except that which he alone can do; or it can be done on a negative basis by which a superior delegates work only when he finds that he has more than he can comfortably undertake himself.
Necessity	Every person engaged in management must by definition delegate some of his work; conversely a person who does not delegate any work at all is not engaged in management. Indeed Brown (see Bibliography) defines a managerial role as one from which some work has to be delegated to subordinate roles. '... there must be much more extensive delegation of executive business to officers. Only by this means do we see hope of relief to over-burdened councillors ...' (Report of the Royal Commission on Local Government in England). 'To encourage effective and efficient decision-making and to project a businesslike image there must be a logical pattern of delegation. All decisions should be taken at the lowest practicable level.' 'It has been suggested that extensive delegation to officers is in some way undemocratic, but we do not accept this, provided that the terms of delegation are clear and specific.' (The new local authorities' management and structure - the Bains report, HMSO).
Failure	Failure to delegate may have serious consequences: 'One of the tragedies of business experience is the frequency with which men, always efficient in anything they personally can do, will finally be crushed and fail under the weight of accumulated duties that they do not know and cannot learn how to delegate', wrote Mooney and Reiley (see Bibliography).

7.2 Authority and responsibility

Authority/ responsibility	Authority and responsibility are inseparable (see data sheet 8.05, 5.5). 'Normally the subordinate's area of responsibility and area of authority should be coterminous; if a man has authority but not responsibility he will be interfering by giving instructions on matters for which someone else is responsible: on the other hand, if his area of responsibility is greater than that of his authority he will receive orders from some other person who bears no responsibility' (The practice of O & M, HMSO). 'It is a basic principle of management that
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Limitation	responsibility and authority must coincide, and it follows that if officers are given the authority to take decisions they must also accept the responsibility for the consequences of those decisions' (The Bains report). Thus the process of delegation involves giving subordinates authority to carry out certain work and it is necessary to set out the limits of the authority so delegated. The subordinate is responsible for the action he takes and the decisions he makes, and is accountable to his superior for them. The authority that has been delegated to him is only part of the superior's whole command.
Accountability	Accountability is defined by Brown (see Bibliography) as 'the quality of a role (or a group of roles) that determines that the incumbent shall be answerable for the consequences, direct or otherwise, of his use of authority'. The superior retains overall responsibility for his whole command, and is himself in turn accountable to his superior; eg a deputy is accountable to his chief, a chief officer to his committee, and the committee to the council. The superior '... retains overall responsibility for the whole of the work, (and) his subordinate staff have immediate responsibility for their individual portions' (The practice of O & M).

7.3 Motivation

Job satisfaction	The needs of the superior are not the only ones that are relevant to delegation. Subordinates need to derive satisfaction from their work in order to give of their best. This satisfaction can come in part from delegation. 'Decentralisation and delegation are ways of freeing people from the too-close control of conventional organisation, giving them a degree of freedom to direct their own activities, to assume responsibility and, importantly, to satisfy their egoistic needs', wrote Douglas M McGregor in The human side of enterprise.
Acceptance/ coercion	A similar view was expressed by J H H Wilkes, county surveyor of Somerset in The municipal engineer in modern life (Proceedings of the Institution of Municipal Engineers, Vol. LXXX): 'The more authority a man accepts, the better will be his work. Many a man has remained moderate because he has not actively sought this burden, while his chief has not encouraged him to accept it. It is of course dangerous to coerce an unwilling man to take the load; such a man may be anxious to gain an increase in salary, but is unwilling to accept the care and worry that goes with the job. But a man worthy of the name will only give of his best and strive to improve if he carries authority.'

## 7.4 Delegation in local government

Local Government Act 1972

(i) **Legality:** Reporting in 1967, the Committee on the Staffing of Local Government (Mallaby) said that 'the law does not provide for delegation of decision-making to officers . . .' and recommended, as did the Committee on Management in Local Government (Maud), that delegation to individual officers should be permitted by new legislation.

The Town and Country Planning Act 1971 stated in s4 that a local planning authority may delegate to any officer the function of determining applications for planning approval within certain specified categories. This power has now been superseded and extended by the general power given in s101 of the Local Government Act 1972 to a local authority to delegate many of its powers to a committee, a sub-committee or an officer.

Independence

The Mallaby report noted that although the law did not provide for the delegation of a council's powers or functions to officers, nevertheless in practice 'officers often have to take independent decisions and actions but always within the framework of the legal powers and general policies of their council'.

Written authority

(ii) **Practice — members to officers:**

Delegation from council to committee is probably in most cases by resolution of the council and therefore recorded in minutes. Similarly delegation from a committee to officers is in many cases recorded in minutes.

Unwritten authority

Many chief officers operate under delegated powers which are unwritten and arise out of the practice in their authorities, or out of the assumed powers of professional staff. To include in minutes all the activities usually carried out by an engineer and surveyor would result in a list of considerable length.

(iii) **Practice — officers to officers:**

Birmingham CB

A research team working for the Royal Commission on Local Government in England examined how delegation was practised in several departments of the City of Birmingham, and their results were published in *Research studies 7, aspects of administration in a large local authority*.

Trial and error

It was found that there was no codified manual in the public works department stating at which points decisions must be made by various officers. 'The system adopted within a division is dictated by the divisional head, and of necessity a trial and error process is involved. However there soon develops within a division an understanding of who is responsible for what, and it is generally apparent to an officer when he is faced with something which needs a decision from a higher point in the hierarchy of the responsibility network'.

Judgment

'Basically in the public works department it is an understood thing as to who makes decisions at various levels. The development of judgment when to "put the chief in the picture" is a most important attribute of a divisional head'. 'This knowledge of the delegation of responsibilities and the matters over which discretion may be exercised are things which can only be learnt by serving in a particular post and getting to know the ropes. Generally speaking, for a senior officer appointed from outside to a particular post it may take about

Mutual trust

one year to become fully acquainted with the delegations and discretionary levels attached to a post'.

'As in the case of co-ordination, mutual trust must be built up between officers, for only by this means can zones of responsibility and levels of discretion within these zones be established on an effective workable footing'.

The system in operation in the Birmingham CB public works department is probably similar to that in most municipal engineers' departments. Although there is no codified manual, there are nevertheless limits to delegation. Brown points out that these limits 'are discoverable in all areas'. 'If policies remain unwritten, as is so often the case . . . then a newcomer to a role will be in a difficulty'.

Unwritten policies

Written authority

Ideally the part of a function to be delegated to a subordinate should be written down together with the limits within which he may act without reference upwards. Established policies relating to each function should be set out in writing.

## 7.5 Control

Restricted freedom

Delegation of certain functions to a subordinate does not permit him to act with absolute freedom. If a subordinate misuses his authority his superior may have to withdraw the delegation.

Support

Neither can the subordinate claim the right to be supported by his superior in whatever decision is made: 'There is obviously no rule or convention which says that a delegating manager must back his subordinate, right or wrong'. (Charles Bowen, 'Delegation', *Management Today*, January 1968).

Review of constraints

The superior needs to delegate in such a way that he retains overall control of his whole command, without placing too many restrictions on his subordinates. 'In some (local authorities), however, the senior staff do not check sufficiently that delegated responsibility is leading to the right decisions by the right officers' (*Report of the Committee on Highway Maintenance* — Marshall).

'Delegation gives freedom of action to officers, but if the members are to control the process, limits to that freedom must be defined, they must be monitored and they must be reviewed . . .' (Professor J D Stewart, *Management in local government*, Charles Knight).

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# A Municipal Engineering Data Sheet



The lack of effective delegation in municipal engineers' offices causes serious dissatisfaction among junior engineers and leaves senior officers with too much to do.

Qualified engineers feel that their job is engineering and they should be left to get on with it, as they think fit, but this often ignores the views of the members of Councils and the feelings of the public. Unfortunately, this leads to a reluctance on the part of senior officers to delegate sufficiently, fearing the consequences of an all-engineering solution.

Engineers tend to feel that their responsibility is to engineering rather than to their Council or to the public.

There is a general lack of knowledge about the purpose and use of delegation. Senior officers think it alternatively a matter of getting rid of work, or a risk not worth taking because of the quality of their staff. Junior officers look upon it as a means of getting rid of irritating control from above.

It is hoped that this sheet will help to rectify these extremes of views.

It remains to be said that delegation will not work properly without understanding by both sides of its purpose and limits. Neither will it work properly without staff of the right calibre. The most important attribute in a senior officer is the ability to recruit and retain good staff.

In the case of delegation as in so many other aspects of local government work, it should be possible to set out delegation in specific terms, with specific limits which would be usable by all Local Government officers; i.e. we need a management handbook.

There may be special problems in relation to delegation to professional

people that should be examined in more detail later; e.g. a senior surgeon delegating to a junior surgeon (qualified) would leave all the work to the junior. Does the same thing happen in local government?

What happens, though, when a senior officer is responsible for work of a discipline in which he is not qualified; e.g. a chief executive who has overall responsibility for the other officers? Or an architect chief officer who has structural engineers on his staff; e.g. the Berkshire county hall case?

Again, as one gets older one is no longer au fait with the latest techniques, e.g. limit state design, even in one's own primary field.

How do all these things affect delegation and responsibility? We ought to know. Who is responsible when things go wrong?

How much checking should a chief officer do to see that delegation is working? Indeed, what checking can a chief officer do?

# MANAGEMENT

## FILE REFERENCE 8.08

### Centralisation and decentralisation

*In all but the smallest organisations a measure of decentralisation is needed (data sheet 8.04(1):4.4(iv)), and its extent must be decided upon. Once established, the ratio of centralisation to decentralisation is not immutable but should be varied as responsibilities, technical developments, and the capabilities and attitudes of members of the organisation change. Thus reorganisation of local government will demand decisions on centralisation and decentralisation within every new local authority and also between authorities where section 101 of the Local Government Act 1972 is invoked.*

#### ● CENTRALISATION AND DECENTRALISATION

##### 8.1 Centralisation

**Natural** In *General and industrial management* (Pitman, 1969) Henri Fayol said that centralisation belongs to the natural order, and is present in all organisations to a greater or lesser degree (data sheet 8.03: 3.1(h)). In deciding the amount of centralisation he said that 'the objective to pursue is the optimum utilisation of all faculties of the personnel'. The greater the degree of centralisation, the lesser the importance of subordinates.

**Restraints on subordinates** H A Simon in *Administrative behavior* (The Free Press, 1968), distinguished two aspects of centralisation: 'On the one hand, decision-making powers may be centralised by using general rules to limit the discretion of the subordinate. On the other hand, decision-making powers may be centralised by taking out of the hands of the subordinate the actual decision-making function.'

**Effect of amalgamation** In *The reality of management* (Pan Piper, 1963) Rosemary Stewart states that 'More centralisation . . . was necessary in the early days of nationalisation, as in many other forms of amalgamation'. The amalgamation of several local authorities into one larger one will inevitably mean more centralisation of decision-making for a limited period at least, so that common policies and practices can be evolved and established throughout the whole area of the new authority.

(i) **Advantages:** Potential advantages of centralisation as set out in *The practice of O & M* (HMSO, 1965) are:

- Mechanisation and specialisation** (a) The concentration of work may provide scope for staff economies and mechanisation. Some advantages may also result from specialisation;
- Control** (b) a tight control of efficiency, accounting and audit may be achieved at low cost;
- Economy** (c) the total amount of administrative and managerial effort may be reduced;
- Flexibility** (d) changes in the work can be made more quickly;
- Equality** (e) equality of treatment is secured more easily.

#### (ii) Central functions

**Bains' list** (a) *Authority based:* The Bains report, *The new local authorities, management and structure* (HMSO), suggests that the following services be centralised on an authority basis: personnel management, O and M, computer, research and intelligence, corporate planning unit, project control, purchasing, legal services, public relations, registration functions, archives, acquisition of land and buildings, some administration, and some work study.

**Computer usage (or computerisation)** It is particularly important to centralise

**Information system**

control of the computer. H H Albers in *Principles of management* (John Wiley, 1969) states that 'A single computer centre creates conditions that make for some form of centralised control if computers are to be effectively utilised by more than one department. If the responsibility for computerisation is placed under one department, such as accounting or production, there is often difficulty in gaining acceptance from other departmental executives at the same organisational level'. The computer is bringing change to the centralisation/decentralisation issue because it can place information before top management as quickly as or more quickly than subordinates formerly received it. There may be a general trend, therefore, towards centralisation where the computer is used to support a management information system.

**Practice**

(b) *Department based:* Some of the functions that are commonly centralised in municipal engineers' departments are wages, accounts, most records, plant and vehicle maintenance, design of highways, bridges, housing, sewerage and sewage disposal. The *Report of the committee on highway maintenance* (Marshall), stated that 'the existence of a work planning section should lead to increased centralisation of the maintenance operation where this leads to improved efficiency. In some cases, such as resurfacing or surface dressing, central planning of all work, including any to be done by contractors, could lead to direct economies'.

**Economies**

##### 8.2 Decentralisation

**Proportion**

In Fayol's view, it was not a question of centralisation or decentralisation, but rather one of proportion: ' . . . it is a matter of finding the optimum degree for the particular concern'.

In *The new science of management decision* (Harper and Row, 1960), H A Simon stated: 'But centralising and decentralising are not genuine alternatives for organising. The question is not whether we shall decentralise, but how far we shall decentralise'.

**Delegation**

In *Principles of management* (McGraw-Hill, 1968), Koontz and O'Donnell state that 'whether authority should be concentrated or dispersed throughout the organisation is a question not so much of what kind as of how much authority. Decentralisation of authority is a fundamental phase of delegation. . . .' (data sheet 8.07).

**A philosophy**

'Although closely related to delegation of authority, decentralisation is more', state

Koontz and O'Donnell: 'it is a philosophy of organisation and management, implying both dispersal and concentration of authority. It requires far more than simply handing authority to subordinates. As companies find when they begin to decentralise, it requires careful selection of what decisions to push down into the organisation structure and what to hold at or near the top, specific policy making to guide the decision making, selection and training of people, and adequate controls. Indeed, decentralisation encompasses all areas of management'.

(i) **Advantages:** The main potential advantages of decentralisation as set out in *The practice of O & M* are:

- (a) Local circumstances can be taken into account in carrying out the work and making decisions;
- (b) public relations may be improved, for the sense of remoteness is eliminated;
- (c) the effect of actions and decisions can be observed very quickly and corrective action taken if required;
- (d) decisions are taken more speedily, for there is no pipeline to the centre to be traversed;
- (e) the work may become more interesting and give greater scope for initiative;
- (f) the recruitment of staff may be easier.

However, Rensis Likert in *The human organisation* (McGraw-Hill, 1967) issued a word of warning on the advantages of decentralisation: 'Decentralisation is becoming, moreover, an inadequate solution as technologists become more complex and ever more extensive functionalisation becomes essential. Decentralisation, furthermore, does not eliminate differences among staff or among departments, it merely changes the relationship of who differs with whom about what'.

(ii) **Decentralised function:** It is common in large local authorities, for example, to decentralise to area offices functions such as highway maintenance, cleansing, salting, and development control under the planning Acts. The *Management study on development control* (HMSO) recommended 'that all county councils should operate decentralisation systems with area committees with full executive authority composed of county and district council members'. However, the Bains report pointed out that a number of authorities had abandoned the concept of area committees generally. The report stated that although county councils in particular would have to consider methods of establishing and maintaining contact with the public and with the district councils, it did not seem that this required the setting up of area executive committees with delegated powers.

(iii) **Requirements:** Koontz and O'Donnell say that there cannot be 'absolute' decentralisation, therefore certain measures have to be considered to make decentralisation effective; these, summarised and adapted to suit local government from *The practice of O & M*, are as follows:

- (a) The issue of interpretive statements of policy by headquarters;
- (b) the issue of detailed instructions;
- (c) the reservation of decision in particular types of case to headquarters;
- (d) the standardisation of the staffing and organisation of local offices and the

methods and technical processes used; the setting of quality and quantity standards and expectations of output;

(e) the establishment of an inspection service aimed at ensuring that standards of accuracy, quantity and management are adequate;

(f) the giving of advice and direction at a central point in the organisation on questions arising locally which cannot be settled there. Such a unit would co-ordinate and harmonise policy interpretations over the whole area of an authority;

(g) the provision of central training facilities;

(h) the reservation to headquarters of the launching, central progressing, and control of new work until accepted standards can be established.

Inspection

Uniformity

Training

New projects

### 8.3 Effect of local government reorganisation

Four types of authorities and interaction

Broadly, local government and associated reorganisations set up four new types of authority: counties (regions in Scotland), districts, regional water authorities, and area health authorities, all of which interact with one another to a greater or lesser degree. For example, the statutory division of the planning function should encourage the establishment of adequate consultation and liaison arrangements between counties and districts; and the decentralisation of functions through agency arrangements to second tier authorities in, for example, highways or sewage disposal, will necessitate the setting up of close working arrangements between the authorities involved.

The Bains report said that there is a strong case for having the area offices of the county council in the same building as those of the district council. It also said that wherever possible the aim should be to make the boundaries of the county council's 'areas' coincide with those of district council boundaries.

It recommended that 'there should be a district joint committee of county and district members for each district within the county to co-ordinate the interaction of all county and district functions and policies for the locality'.

Although these are seen as being 'essentially deliberative and advisory bodies', they could develop into powerful committees exercising considerable power in such matters as planning, town development, highways, traffic management, water, and health. There may also be the appointment of officers holding joint appointments, serving partly the county council and partly the district councils (as medical officers have hitherto served), with county functions being decentralised to its own area office or delegated to the district councils through agency arrangements.

Combined area/district offices

Joint county/district committees

Joint appointments

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The issue of centralisation or decentralisation is of course closely connected with delegation and will have to be consciously considered, and its extent decided upon, during the run-up to 1.4.74 when the new authorities take over.

The writer does not ever recall hearing the issue discussed in local government circles, so as with other subjects in this series, it merely brings to the surface a number of relevant issues and gives references for others to follow up if they think fit.

As with so many other management issues, the matter is indeterminate, and it is therefore difficult for engineers to grapple with, since they are so used to dealing with finite things.

Decentralisation to area officers by county surveyors is common practice though not called such, but referring to it specifically in this sheet does give a point of cognisance for the municipal engineer reader.

It will be interesting to see how many new authorities make radical changes in their organisations and establish joint committees with counties and other bodies, and to see how many continue to work on the basis that the local authority's function is a discrete one, not really having any influence on, or being influenced by, the activities of other bodies.

Decentralisation by a local authority to its own area officers is one (internal) thing; decentralisation to a joint committee of county and district members is something quite different and is only likely to occur in rare cases. Nevertheless, it would be interesting to see how it worked. As is pointed out in the sheet, the personality of the persons involved would have a significant effect in such cases.

# MANAGEMENT

## FILE REFERENCE 8.09 Management of change

*Change occurs in organisations frequently; for example it may arise from the expansion of a department, the division of a department into two, the introduction of new methods or new equipment, or from a re-arrangement of responsibilities within a department. Some changes are quite small; some, such as local government reorganisation, are very large. The introduction of any change may raise problems, and requires care; these problems and some methods of minimising their effects are discussed in this data sheet.*

### ● MANAGEMENT OF CHANGE

#### 9.1 Resistance to change

**Machiavelli** 'It must be considered that there is nothing more difficult to carry out, nor more doubtful of success, nor more dangerous to handle, than to initiate a new order of things. For the reformer has enemies in all those who profit by the old order, and only lukewarm defenders in all those who would profit by the new order . . . . So wrote Niccolo Machiavelli in *The Prince* around 1513. That statement is as true as it was then. Desmond Keeling in *Management in government* (George Allen and Unwin 1972) states: 'There are some who see the public service as designed to have, or as having acquired, the maximum possible resistance to change and thus to improved management.'

**Conservatism** People normally prefer stability to change — frequently referred to as 'the inherent conservatism of man.'  
In *Human relations in management* second edition 1967 (South-western Publishing Company), Huneryager and Heckmann state: ' . . . it is unfortunate that many people have a tendency overtly or covertly to resist it (change), frequently to the extent of seriously impeding or completely thwarting its effectuation. Perhaps a basic reason why this resistance occurs . . . is that most changes distort the equilibrium of the situation and environment in which individuals and groups exist.'

**Fear** Professor A T M Wilson defines (see *Management in government*) three main forms of anxiety over change:  
(i) Fear of change in the ways in which things are done and the impact of this on customary ways of working ('work culture') and over customary levels of effort and satisfaction in one's job.  
(ii) Fear of loss of job or loss of career prospects.  
(iii) Fear of a relative diminution of the power or prestige of one's functional group, or of the category of employees of which one is a member.

**Technical and social aspects** Paul R Lawrence (see *Bibliography*) considered it useful to think of change as having both a technical and a social aspect. 'The technical aspect of change is the making of a measurable modification in the physical routines of the job. The social aspect of the change refers to the way those affected by it think it will alter their established relationship in the organisation.' It seems likely that technical aspects of change are resisted to a much lesser degree than are the social aspects.

**Equilibrium** When stable customary expectations are disturbed, the individual attempts to adapt to his new social environment so as to maintain his own psychological equilibrium; he may do so by resisting the change. ' . . . the social situation, that is, his relationships with others, the social norms which govern them, and the shared interests with like folk which are associated with them, will deeply influence the way the individual interprets the change — and what he regards as disturbing.' (Lupton — see *Bibliography*.)

#### 9.2 Need for change

' . . . it must be stressed that the health of an organisation depends to a great extent on its ability to adapt to changes internally and in its environment. This need is accelerating due to expanding technology and changing expectation of employees' (see *Bibliography*: Davis and Scott).

**Reorganisation** In local government the immediate cause of impending large scale change is the reorganisation set out in the *Local Government Act 1972*, which is supplemented by the recommendations of the Bains report, *The new local authorities, management and structure* (HMSO). The most apparent changes that will arise from these proposals are structural, but there will also be many changes in processes, systems, procedures and in relationships.

**Ends and means** In *Setting up the new authorities* (Charles Knight, 1972), Joyce Long and Alan Norton say: 'How well the problems of change are tackled will largely determine the capacity to improve services and the spirit in which the challenge is met. These matters are as fundamental as any that are involved, for the end results will inevitably be determined by the means that are adopted.' The immediate impact of these changes will occur in 1973 and 1974, but change will take place in succeeding years too, as each organisation evolves in an attempt to adjust to its changing duties and responsibilities.

**New technology** Failure to adapt to change as the need arises may result in drastic, unforeseen, changes in the organisation. In *The management of innovation* (Tavistock Publications Ltd, 1968), Burns and Stalker discuss the effect of bringing a new technology (electronics) into an electrical engineering firm. 'Electronics work had come into the firm in the guise of a new, virtually independent organisation. No adaption by the existing organisation had been called for, or had been possible. Indeed, the arrangement had been made "so as not to

**Extinction** *disrupt the existing structure*'. Consequently, when the new growth was firmly established, there was only one course open to the former laboratory establishment — the acceptance of extinction, at best after the existing staff had retired or found other jobs.'

**Municipal engineers** In addition to bringing change to local government itself, reorganisation may bring change to the profession of municipal engineering. Professor J D Stewart said in 'Significance of reorganisation for the municipal engineer' (*Municipal Engineering*, 10 November 1972), that it should, viz, '... unless professions change they will eventually be changed'. 'The profession that will best survive is the profession that most recognises the need to change itself to changing needs.'

9.3 Approaches to change

**Three approaches** Harold J Leavitt distinguishes three major approaches to organisational change: structural, technological, and people-approaches (for an abridged version of his views see *Management and motivation* edited by Vroom and Deci, Penguin modern management readings).

Structural change may be brought about, he says, by redefining areas of authority and responsibility, strengthening the chain of command, by decentralisation, by better organisation of work flow, and by improved communication networks.

Technological change includes approaches based on the 'scientific management' concept, and methods such as operational research. The people-approaches 'try to change the organisational world by changing the behaviour of the actors in the organisation'. In the view of Edgar H Schein (see *Bibliography*: Davis and Scott), most theories of influence or change accept the premise that change will not take place unless the individual is motivated and ready to change. Since the technical aspects of change are more readily accepted than the social ones, and since the social ones involve influencing the attitudes of individuals, Schein suggests that it is appropriate to consider influence as 'a process which occurs over time and which includes three phases:

**Motivation**

(i) **Unfreezing**: an alteration of the forces acting on the individual, such that his stable equilibrium is disturbed sufficiently to motivate him and to make him ready to change; this can be accomplished either by increasing the pressure to change or by reducing some of the threats or resistances to change.

(ii) **Changing**: the presentation of a direction of change and the actual process of learning new attitudes. This process occurs basically by one of two mechanisms:

**Identification** (a) the person learns new attitudes by identifying with, and emulating, some other person who holds those attitudes; or

**Internalisation** (b) the person learns new attitudes by being placed in a situation where new attitudes are demanded of him as a way of solving problems which confront him and which he cannot avoid; he discovers the new attitudes essentially for himself, though the situation may guide him or make it probable that he will discover only those attitudes which the influencing agent wishes him to discover.

(iii) **Refreezing**: the integration of the changed attitudes into the rest of the personality and/or into the ongoing significant emotional relationships.'

9.4 Planning for acceptance of change

**Change welcome** As people resist change, and since change occurs frequently in organisations, it is desirable to make people aware of the fact and thus induce in them an attitude that welcomes change. For example, planned change in careers occurs within the civil service. In *Portrait of a Profession* (Cambridge University Press, 1950), Sir Edward Bridges said: 'There is a healthy practice that, particularly in their younger years, men and women should change their jobs within the department every three years or so.' 'These frequent changes of duties ... induce a wider outlook. The first time a man is told to change from work which he has mastered to a new job, he may feel that the special knowledge he has acquired is being wasted. He may grudge the labour of mastering a new subject and may even wonder whether he will be equally successful at it. But when a man has done five jobs in 15 years and has done them all with a measure of success, he is afraid of nothing and welcomes change.'

**Confidence** In *Principles of management* (McGraw-Hill, 1968) Koontz and O'Donnell list 10 criteria of the acceptability of change. Change is more acceptable:

**Ten criteria**

- Understanding** (a) when it is understood than when it is not;
- Stability** (b) when it does not threaten security than when it does;
- Involvement** (c) when those affected have helped to create it than when it has been externally imposed;
- Impersonal** (d) when it results from an application of previously established impersonal principles than it is when it is dictated by personal order;
- Successful** (e) when it follows a series of successful changes than when it follows a series of failures;
- Singly** (f) when it is inaugurated after prior change has been assimilated than when it is inaugurated during the confusion of other major change;
- Planned** (g) if it has been planned than if it is experimental;
- Novel** (h) to people new on the job than to people old on the job;
- Fair shares** (i) to people who share in the benefits of change than to those who do not;
- Adaptability** (j) if the organisation has been trained to accept change.

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In some ways senior officers in local government are used to change, in that political control of a council can change comparatively often, and there can be sharp changes in certain policies. Also, because of public or party pressure, a decision can be reversed within a matter of months. It is therefore desirable for senior officers to be objective in their outlook because otherwise change can be seen as a threat to either stability or progress.

Also there is change in the professional field, in, for example, technical design, and imperial to metric measure.

The changes that cause trouble are promotions, regradings and methods - "we have done it this way for two decades and nothing has gone wrong - why change it now?" Both statements may well be untrue, though comforting to the believer.

Some people, of course, like change for its own sake, and it probably does not matter very much what the change is from or to.

So far as municipal engineering is concerned, there has been considerable change in the last 100 years. Beginning with streets and drains, it took on housing, building byelaws, and later fostered town-planning. Public housing and town-planning have now grown away from it in the larger authorities. Municipal engineers still retain control of many technical or operational functions, and in spite of the efforts of some people and organisations to kill it off, there seems to be little doubt that municipal engineers' expertise will be needed as far ahead as one can see. (N.B. Vide the writer's paper, "Districts technical services departments - their functions and future" published in the IME Journal, Vol. 103, No. 5, May 1976).



Nevertheless, a searching examination of the rise of the range of duties of municipal engineers, of the changes that have taken place in the last 25 years, and of the changes likely to take place in the next 25 years would be helpful to the service and to the profession.

MANAGEMENT

FILE REFERENCE 8.10(1)  
Decision-making

'Decision-making is, in fact, the prime characteristic of the management function, and the success or failure of an organisation depends on the rightness or wrongness of managerial decision.' '... it exists at all levels in the organisation and is demanded in all phases of its activity,' said N Rayman, city engineer and surveyor, Coventry CBC, in a paper read to the annual conference of the Institution of Municipal Engineers, 1966. This data sheet examines the process of decision-making at all levels in an organisation.

DECISION-MAKING

10.1 Definition and purpose

**Choice** 'Decision-making may be narrowly defined as the making of a choice from among alternative courses of action. More broadly construed, decision-making also involves all of the actions that must take place before a final choice can be made.' (H H Albers, *Principles of management*, 3rd ed, 1969, John Wiley and Sons.)

**Prime function** M R Hawkins, borough engineer and planning officer, Torbay BC, said (Journal, Institution of Municipal Engineers, vol 95): 'The prime function of all management can be summarised as decision-making, since the end-product of all the engineer's deliberations is the making of a decision.'

**Total function** N Rayman (*op cit*) uses the term 'decision-making' to sum up the management function: '(a) the definition of the purpose of existence of the organisation and the aims and objectives that it must achieve; (b) the formulation of organisational policy, and (c) controlling such adaptation of the system as is needed to meet the effects of influences external to the system (and thereby not organisationally controllable by management) which impede achievement of objective.'

Richard M Cyert and Lawrence A Welsch (*see bibliography*) state succinctly: 'We view decision-making as synonymous with managing.'

**Psychic event** Decision-making has been described as '... the focal creative psychic event where knowledge, thought, feeling, and imagination are fused into action' (Shackle, G L S — *Uncertainty and business decisions: a symposium*, 2nd ed, Liverpool University Press 1957).

**Purpose** Desmond Keeling in *Management in government* (George Allen and Unwin, 1972) wrote '... any significant development of management in the public service, any intensive and sustained search for a better use of resources, must be founded on a rational basis of decision-making'.

10.2 Levels

Decision-making takes place at all levels in an organisation (*data sheet 8.01;1.2*), and all decisions should be made at the lowest practicable level (*data sheets 8.07:7.1, and 8.08:8.1*). Both the complexity of problems and the uncertainty of the outcome of decisions increase at higher levels in the organisation.

(i) Dale: Ernest Dale (*see bibliography*) defines three classes of decisions:

(a) the lowest level of decision-making, made at the point at which work is being

done; not usually recorded as such, though a note of the effect of the decision will be made at some point.

**Administrative** (b) made within the framework of policy decisions but less important than them; may be recorded in procedure manuals.

**Policy** (c) major decisions in the formation of the organisation including structure; usually incorporated in written documents. Applying this classification to decision-making in municipal engineering, it may be said that 'executive' decisions are made by design and supervisory staff, 'administrative' decisions by chief and other senior officers, and 'policy' decisions by the local authority.

(ii) Keeling: Desmond Keeling (*op cit*) also defined three levels of decision-making on the use of resources primarily so as to discuss the methods and techniques available to improve decision-making:

**Lowest** (a) The characteristic of this level of decision-making on resources is the "implementation of decisions" approach. In the public service resources used can be regarded as inputs which produce "outputs" expected to achieve or contribute to the fulfilment of the objective'.

**Middle** (b) This second level is considered as '... lying within a single broadly homogeneous sector ... such as defence, transport, arts, education, health and welfare on which the British planning of public expenditure is based ...'

**Highest** (c) The allocation of resources between the large broad categories described in the second level is defined as the third level of decision-making. 'In scale and complexity this kind of choice is primarily found in central government, although in a limited form it can be seen to exist also in local government'. Keeling says that it is important to recognise that this macro-allocation stage is one which needs to be considered separately from other kinds of decision-making on resources.

10.3 Process

(i) Simon: The process of decision-making involves three steps according to H A Simon (*Administrative behaviour*, 2nd ed, 1965, The Free Press):

**Alternatives** (a) the listing of all the alternative strategies,

**Consequences** (b) the determination of all the consequences that follow on each of these strategies;

**Analysis** (c) the comparative analysis of these sets of consequences. He points out, however, that it is not possible for ar:

# 8.10 MANAGEMENT

individual to know all the alternatives, or all their consequences, and so in practice decisions are made that appear to be adequate.

Maximising	'While economic man maximises — selects the best alternative from among those available to him; his cousin, whom we shall call administrative man, satisfices — looks for a course of action that is satisfactory or "good enough". Administrative man, he says, makes his choices using a simple picture of the situation that takes into account just a few of the factors that he regards as most relevant and crucial.
Satisficing	
Limited choice	'First because he satisfices, rather than maximises, administrative man can make his choices without first examining all possible behavior alternatives and without ascertaining that these are in fact all the alternatives. Second, because he treats the world as rather "empty", and ignores the "interrelatedness of all things" (so stupefying to thought and action), administrative man is able to make his decisions with relatively simple rules of thumb that do not make impossible demands upon his capacity for thought'. Nor, it should be noted, upon his time.
Impracticable	As Koontz and O'Donnell ( <i>see bibliography</i> ) have noted, the complexity of the higher level decisions particularly, is such that it is impracticable to find out and consider every aspect of a problem. It is necessary therefore to establish the crucial or critical factors in each case and concentrate on them; this they describe as the principle of the limiting factor. (ii) Drucker: In <i>The practice of management</i> Peter F Drucker (Pan Piper, 1968) describes decision analysis ( <i>data sheet 8.04, 4.3(ii)</i> ) as a major tool in deciding structure. He states that decision-making has five distinct phases, summarised as follows. (a) What appear at first sight to be the elements of the problem rarely are the really important or relevant things, therefore the real problem has to be identified and defined. (b) For analysis the problem needs to be classified, and the facts established. It is necessary to classify the problem in order to know who must make the decision, who must be consulted, and who informed. To establish the facts the decision-maker has to seek the required information. (c) Alternative solutions are needed lest it be thought there are only two choices. One alternative is always that of taking no action. (d) There are four criteria for determining the best solution: (i) The risk associated with each course of action has to be weighed against the expected gain. (ii) Which alternative gives the greatest results with the expenditure of least effort? (iii) If urgency is the primary factor, dramatic action is required; if long consistent effort is needed a slow start that gathers momentum may be preferable. (iv) The most important resource is people; are they up to the task?
Defining the problem	
Analysing the problem	
Developing alternative solutions	
Deciding on the best solution	
Risk	
Economy of effort	
Timing	
Limitation of resources	

Making the decision effective

(e) Action is needed for a decision to become effective, and this is achieved by communicating the decision to others and motivating them to carry it out.

Levin

## (iii) Models

(a) One model of the decision-making process has been evolved by P H Levin, and described in 'On decisions and decision-making' (*Public Administration*, Spring 1972, vol 50). He suggests that '... the process may be divided into technical, administrative and political categories ...' and that '... in the course of the decision-making process as a whole the decision-makers become increasingly committed to an increasingly specific ultimate course of action ...'

Mack

(b) Another model has been evolved by Ruth P Mack of the Institute of Public Administration, New York, and it is set out in *Planning on uncertainty, decision making in business and government administration* (Wiley-Interscience, 1971). It contains five phases: deliberative, ongoing, staged, recursive, and administrative. It is partly cognitive and partly behavioural.

## 10.4 Elements

Peter F Drucker in *The effective executive* (Pan Piper, 1970) enumerates five elements of the 'effective decision-process', summarised as follows:

Rules

(a) Is the problem generic or unique? Most problems are generic, and decisions on them should be made by the application of a rule or principle. Problems which may be thought of as unique to the organisation, eg a local authority, may be generic to local government as a whole. 'All events but the truly unique require a generic solution. They require a rule, a policy, a principle. Once the right principle has been developed, all manifestations of the same generic situation can be handled pragmatically, that is, by adaptation of the rule to the concrete circumstances of the case'.

Specification

(b) A clear specification of the objectives to be attained and the conditions to be satisfied is required.

Rightness

(c) Thinking through what is 'right' — the solution that will fully satisfy the specification and the boundary conditions. Compromise is always needed, but it is first necessary to know the 'right' solution in order to distinguish the right compromise from the wrong one.

Implementation

(d) Converting the decision into action is the fourth major element in the decision process — a decision will not become effective unless the action commitments have been built in from the start.

Feedback

(e) The decision must include taking action to monitor its effects so that the results may be tested against the specification.

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# MANAGEMENT

## FILE REFERENCE 8.10(2) Decision-making

Data sheet 8.10(1) dealt with the definition and purpose of decision-making, with levels, process, models, and elements. This sheet deals with types of decision, techniques to assist decision-making, and with developing skills

### DECISION-MAKING

#### 10.5 Types of decision

Programmed Non-programmed	(i) <b>Simon</b> H A Simon in <i>The new science of 'management decision</i> (in <i>The shape of automation for men and management</i> , Harper and Row, 1965) defines two types of decision: programmed, and non-programmed. He sees these as forming a whole continuum, with highly programmed decisions at one end, and highly unprogrammed ones at the other end. He borrows the term 'program' from the computer trade, program being 'a detailed prescription or strategy that governs the sequence of responses of a system to a complex task environment'.
Programmed-routine	'Decisions are programmed to the extent that they are repetitive and routine, to the extent that a definite procedure has been worked out for handling them so that they don't have to be treated <i>de novo</i> each time they occur.'
Non-programmed—novel	'Decisions are non-programmed to the extent that they are novel, unstructured and consequential. There is no cut-and-dried method for handling the problem because it hasn't arisen before, or because its precise nature and structure are elusive or complex, or because it is so important that it deserves a custom-tailored treatment.'
Techniques	One of Simon's purposes in distinguishing between the two types of decision is to show that different techniques are used for programmed, and for non-programmed decision-making. These techniques are shown in table 1. Techniques for programmed decision-making are shown in the top half of the table, and those for non-programmed decision-making in the bottom half. Traditional techniques are shown in the middle of the table, and modern techniques on the right-hand side.

Traditional and modern techniques of decision-making (table 1)

Types of decisions	Decision-making techniques	
	Traditional	Modern
Programmed: Routine repetitive decisions. Organisation develops specific processes for handling them	1. Habit 2. Clerical routine: Standard operating procedures 3. Organisation structure: Common expectations A system of subgoals Well-defined informational channels	1. Operations research: Mathematical analysis Models Computer simulation 2. Electronic data processing
Non-programmed: One-shot, ill-structured novel, policy decisions. Handled by general problem-solving processes	1. Judgment, intuition and creativity 2. Rules of thumb 3. Selection and training of executives	Heuristic problem-solving technique applied to: (a) training human decision makers (b) constructing heuristic computer programs

Habit	(ii) <b>Programmed; traditional</b> 'Habit is the most general, the most pervasive, of all techniques for making programmed decisions. The collective memories of organisation members are vast encyclopedias of factual knowledge, habitual skills and operating procedures.'
Routine	Standard operating procedures are closely related to habit. 'The only difference between habits and standard operating procedures is that the former have become internalised – recorded in the central nervous system – while the latter begin as formal, written, recorded programs.'
Structure	'The organisation structure establishes a common set of pre-suppositions and expectations as to which members of the organisation are responsible for which classes of decisions; it establishes a structure of sub-goals to serve as criteria of choice in various parts of the organisation; and it establishes intelligence responsibilities in particular organisation units for scrutinising specific parts of the organisation's environment and for communicating events requiring attention to the appropriate decision points.'
	(iii) <b>Non-programmed; traditional</b> 'Making non-programmed decisions depends on psychological processes that, until recently, have not been understood at all.' They are made by exercising judgment which depends on 'experience, insight and intuition'. Such decision-making can be improved somewhat by training and planned experience.
	(iv) <b>Programmed; modern</b> Modern, programmed techniques involve the systems approach, and include operational research: linear programming, dynamic programming, game theory and probability theory.

(v) **Non-programmed; modern**  
'Many, perhaps most, of the problems that have to be handled at middle and high levels in management have not been made amenable to mathematical treatment, and probably never will.' However, 'basic discoveries have been made about the nature of human problem solving. While these discoveries are still at the stage of fundamental research, the first potentialities for business application are beginning to emerge.' Simon had heuristic methods in mind. Heuristic methods begin by attempting to understand the problem-solving processes in the human brain, covered by the terms intuition, insight, and judgment, and then applying these processes consciously to known problems.

## 3.10(2) MANAGEMENT

### 0.6 Techniques

H Donovan Gauntlett, then city engineer and surveyor, Cardiff, in *The new environment of the municipal engineer*, (IME Journal, vol 93) noted that managers in the private sector had begun to realise that managerial decisions could no longer be based on simple human judgment and experience. He said that municipal engineers should realise that this was so, and learn to put modern techniques to their own use. In his view techniques should be used for technical and design work as well as for clerical and managerial activities.

In addition to the techniques Simon mentions in his four main decision types, there are other individual techniques and systems which are available to the decision-maker:

(i) This is described by Dale (*see Bibliography*), as a mathematical technique which enables the decision-maker to grasp the factors that will affect the outcome of a decision. It displays the alternatives that are estimated to be available in the future, and their probable effects.

(ii) Algorithms or logical trees are described in *C A S occasional papers 2*, and their construction in *C A S occasional papers 12-13* (HMSO). Algorithms are available, for example, to simplify the application of complex rules and regulations to individual problems. A diagram is constructed on the basis of a question-and-answer (yes/no) technique.

(iii) These are described by Cyert and Welsch (*see Bibliography*) as consisting of '... that finite series of mathematical steps which will provide the optimum approach to a particular problem.' Like heuristic models, algorithmic models are normative, ie they establish or set-up a norm or standard.

(iv) Operational research is concerned with the study of operations in an organisational setting, and since it is difficult to introduce change into the real-life situation, O R studies are carried out on an abstract model of that part of the organisation which is being studied.

(v) This technique is useful in highlighting numerous matters that should be considered in evaluating alternative schemes. Is it likely to be increasingly used for either large schemes, or smaller schemes which may have a large impact on the environment. The technique does not itself make decisions but it can assist the decision-making process.

(vi) A planning, programming and budgeting system has been defined as a management system which is designed to assist members and officers in taking decisions about the use of resources (*A review of the theory of planned programme budgeting: a system of management for local authorities*, LAMSAC 1972).

T H Nicholson says that PPBS is a method which enables decision-makers to exercise a reasoned choice (IME Journal, vol 98).

### 10.7 Developing decision-making skills

Natural ability

The techniques discussed above will assist the decision-maker in various ways, but the decision itself still has to be made. It is generally believed that good decision-makers are born, not made, but this is not so. Success in decision-making, as in most things, results from developing natural abilities through learning, practice, and experience, into mature skill.

Experience is a quick, and for many people, an effective method of training. But it involves trial and error in the real life situation, and error cannot always be tolerated.

Business games may be used to simulate actual decision-making processes; alternatively close analysis of decision-making of real situations may assist. Past experience may be a useful guide to future courses of action, though it probably plays a larger part in decision-making than it deserves, according to Koontz and O'Donnell (*see Bibliography*).

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In these sheets decision-making varies from making one decision on one issue, to the whole management process which is conceived as being decision-making, no more and no less.

The main feature of the sheets is to show that basically there are two kinds of decision, those which once made can be used again and again for similar cases until circumstances demand a change. These are 'routine', 'generic', 'programmed', or in local government 'policy' (one of many meanings of that word - for others see Keeling Management in Government).

The other kind of decision is one-off; usually high level and deals with decisions where there is a large amount of uncertainty. These are 'unique', 'non-programmed' decisions.

Simon's 'satisficing' is a well-made concept. For example, in writing these sheets on decision-making the writer searched and found perhaps three times as many references as he used, and could have found hundreds more. But he stopped when he had sufficient to cover the main points (and at not too-high level) which would affect almost all practising local government officers.

Some of the concepts discussed in the paper, e.g. Mack's, will be of little relevance to most readers.

# MANAGEMENT

## FILE REFERENCE 8.11(1) Leadership

*Municipal engineers at all levels of the organisation occupy a leadership role from time to time. Can this leadership role be filled satisfactorily by many people, or are particular traits of character or types of personality needed? Opinion on the requirements for good leadership has changed over the last 50 years as more knowledge has been gained about leadership in different situations. This data sheet discusses leadership, ie the influence that some people exert on others, with particular reference to work situations.*

### ● LEADERSHIP

#### 11.1 Trait theory

(i) **The great men.** Early theory held that good leaders were born, not made — the 'great men' theory. It was thought that the quality of leadership depended on inherited traits or characteristics that were peculiar to a few individuals.

##### Essential abilities

Abilities such as sincerity, selflessness, drive, ambition, initiative, aggressiveness and ruthlessness were considered necessary in every leader since it was observed that successful leaders possessed some or all of these qualities.

##### Nelson

Some exceptional leaders have charismatic qualities (*data sheet 8.02(1), 2.1(a)*). For example Frank Austen, a naval officer, writing to his sister Jane in 1805 about Admiral Nelson, said: 'He possessed in a superior degree the happy talent of making every class of persons pleased with their situation and eager to exert themselves in forwarding the public service' — from *Jane Austen*, by Elizabeth Jenkins (Sphere Books Ltd, 1972).

##### Potential leaders

Similar observations by many people led to numerous studies of the lives of great men since it was expected that these would reveal common traits or characteristics. A knowledge of what these were would enable people to be selected and trained early in life as potentially successful leaders.

##### Montgomery

One such study was made by Field-Marshal Lord Montgomery (who is an Honorary Fellow of the Institution of Municipal Engineers) and published in *The path to leadership* (Collins 1961). In it he stated that his wide experience of observing leaders of various kinds fitted him for seeking out principles of leadership. In his view a leader should be one '... who can be looked up to, whose personal judgment is trusted, and who can inspire and warm the hearts of those he leads ...'

##### Training

He concluded that it would be unusual to find combined in any one individual all the qualities needed for successful leadership but said that leadership could be developed by training. He thought that the number of potential leaders was small, and that resources should not be wasted on training very many people in leadership. Education and character training were of primary importance and should '... inculcate the qualities that are an inseparable element of good leadership'.

##### Qualities needed

Some of the more important qualities he lists are: deep conviction, decision, courage and tenacity, sincerity, the ability to dominate events and a thorough understanding of human nature.

(ii) **Traits of lesser men.** By 1947 numerous trait studies had been made, and these were carefully and thoroughly analysed by

R M Stodgill who published the results in 'Personal factors associated with leadership: a survey of the literature', *Journal of psychology*, vol 25, 1948. The frequency with which a factor was found to be statistically significant was taken as the single most satisfactory criterion for evaluating the data although other criteria were used too. He classified the factors which had been found to be associated with leadership as follows:

- (a) *Capacity* — intelligence, alertness, verbal facility, originality, judgment.
- (b) *Achievement* — scholarship, knowledge, athletic accomplishments.
- (c) *Responsibility* — dependability, initiative, persistence, aggressiveness, self-confidence, desire to excel.
- (d) *Participation* — activity, sociability, co-operation, adaptability, humour.
- (e) *Status* — socio-economic position, popularity.
- (f) *Situation* — mental level, status, skills, needs and interests of followers, objectives to be achieved, etc.

##### Interaction

He concluded that 'A person does not become a leader by virtue of the possession of some combination of traits, but the pattern of personal characteristics of the leader must bear some relevant relationship to the characteristics, activities and goals of the followers. Thus leadership must be conceived in terms of the interaction of variables which are in constant flux and change.'

##### No common pattern

McGregor (*see Bibliography*), and others, have concluded that there is no single basic pattern of abilities and personality traits which are characteristic of all leaders.

#### 11.2 The human relations approach

##### Authority

The emphasis during two world wars on authority and on obedience to rules and regulations, as a pre-requisite of successful organisation, stimulated a reaction against that concept.

##### Freedom

It was thought that simply allowing people to perform their tasks in the way best suited to their own abilities would produce a contented and successful organisation, and much management training has centred round this belief.

##### Misguided

Just as in the former case, the need for authority may have been over-emphasised, in the latter the value of the human relations approach may have been over-stated or at least mis-directed.

11.3 The demands of the situation

Qualities not rare	Mary Parker Follett realised in 1928 (see <i>Bibliography, Metcalf and Urwick</i> ) that there were many different degrees of leadership and that many people have at least some capacity for it. She said that different people possessed different kinds of leadership ability, and moreover that different situations called for the exercise of different types of leadership. These views have been confirmed and expanded by a considerable volume of research in the last 40 years.
Elected	C A Gibb shows (see <i>Bibliography</i> ) that in any particular situation, a leader emerges from within a group because he is perceived by its members as offering the best means of achieving their ends. So long as he continues to satisfy the group's needs, he will remain their leader.
Appointed	A leader appointed from outside the group, or from within the group by outsiders, will have a considerably more difficult task than a leader who is elected by his peers.
Group demand	In Gibb's view it is the nature and purpose of the group, rather than an individual's personality, that is likely to determine who is chosen to lead it. He sees leadership as a social role which depends on a complex of abilities and traits. The same person may be a leader and subsequently a follower in the same group as the group's objectives change.
Principles	According to Gibb the three most important principles are: (i) leadership always relates to the situation in two senses: (a) it flourishes only in a problem situation, and (b) the nature of the leadership role is determined by the goal of the group; (ii) leadership is always directed towards an objective goal; (iii) leadership is a process of mutual stimulation.

11.4 Types of leadership

	(i) <b>Four basic types.</b> Huneryager and Heckmann (see <i>Bibliography</i> ) enumerate four types of leadership:
Fear	(a) <b>Dictatorial:</b> work gets done through fear, by threats of penalties or punishment. It can achieve results but there is doubt about their quantity and quality in the long term, and subordinates are usually dissatisfied.
Centralisation	(b) <b>Autocratic:</b> authority and decision-making are centralised in the leader; participation in decision-making is not allowed, nor is deviation from instructions. It can achieve results but they depend heavily on the leader's abilities.
Decentralisation	(c) <b>Democratic:</b> authority and decision-making are decentralised; participation in decision-making is encouraged and leader and subordinates tend to work as a whole. It offers more promise than other types but requires leaders of better quality.
Licence	(d) <b>Laissez-faire:</b> subordinates establish own objectives and make all decisions; the result is usually disorganisation or chaos because individuals can proceed in different directions.
Domination	Gibb points out ( <i>op cit</i> ) that there is distinction between headship (organisational position) and leadership. Much so-called leadership in employment organisations is in reality domination through headship rather than leadership which stems from personal qualities relative to the particular situation. Nevertheless headship need not exclude leadership.

Variety	(ii) <b>A continuum:</b> Tannenbaum and Schmidt in 'How to choose a leadership pattern', <i>Harvard business review</i> vol 36, no 2, 1958, considered that to categorise leadership types into 'authoritarian' or 'democratic' was too rigid. From time to time leaders felt the need to vary their style of leadership depending on the type of problem being faced. The authors therefore devised a 'continuum of leadership behaviour' stretching from boss-centred leadership at one end to subordinate-centred leadership at the other. There are seven major types within this continuum which summarised are: (a) The manager makes the decision and announces it — boss-centred leadership. He identifies the problems, considers possible solutions, selects one, and instructs his subordinates accordingly. (b) The manager 'sells' his decision. He proceeds as before but, anticipating some resistance in implementing his instructions by his subordinates, he tries to persuade them to accept his decision. (c) The manager presents his ideas and invites questions. Having made his decision as before, the manager conveys it to his subordinates together with the thinking which led up to the decision so that they may have a better understanding of what he seeks to achieve. (d) The manager presents a tentative decision. In the same way as before he has arrived at a decision, but it is only tentative and he is prepared to change it in the light of discussion. (e) The manager presents the problem, gets suggestions from his subordinates, and then makes a decision. This is the first of the types in which the manager has not made the decision on his own. He selects the most promising solution from those suggested. (f) The manager defines the limits and requests the group to make a decision. He states the problem to be solved and the limits within which the solution must lie, but the group (perhaps including himself) makes the decision. (g) The manager permits the group to make decisions within prescribed limits — subordinate-centred leadership. The group defines the problems, seeks alternative solutions, and makes the decision.
Authoritarian	
Persuasion	
Understanding	
Discussion	
Participation	
Group decision	
Delegation	

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MANAGEMENT

FILE REFERENCE 8.11(2)  
Leadership

Data sheet 8.11(1) deals with the development of knowledge of leadership and sets out various types of leadership which have been identified through research. This data sheet discusses leadership style, and its impact on the manager and on the managed.

LEADERSHIP

11.5 Know thyself

Huneryager and Heckmann (see Bibliography) draw attention to the need for those who occupy supervisory or managerial positions to be aware of their own style of leadership and of the impact of that style on the behaviour of others.

They believe that the manager's primary task is to influence the behaviour of people, and that to do this he will develop a leadership style which is founded on his concept of the leadership role.

Thus the more knowledge he has of himself, of his assumptions and beliefs about human behaviour, and of the relationship between leadership style and the performance of subordinates, the better he will be able to influence human behaviour effectively.

11.6 The managerial grid

There has been a tendency for managers who display a prime concern for production to be identified with the scientific management school and thus to be thought to have no concern for people, and for managers who display a prime concern for people to be identified with the laissez-faire school, and thus to be thought to have no concern for output.

Consequently there have been advocates of the 'output' school and of the 'people' school, and managers tend to favour one or other approach.

In *The Managerial Grid* (Gulf Publishing Company, 1966), Robert R Blake and Jane S Mouton bring together the various views on leadership style, and present one comprehensive set of statements on the subject.

The book is intended to accomplish several results: to show the alternative styles that are available to a manager and thus to give the opportunity of increasing personal effectiveness; to provide a method through which managers can assess their own managerial style; to set out the behavioural requirements of changing from one style to another; and to show how through teaching a whole organisation can be improved.

Figure 1 is the *managerial grid*. The x axis depicts concern for production, and the y axis depicts concern for people. Each is expressed as a nine-point scale in which 1 represents minimum concern, and 9 represents maximum concern.

Each of the five points shown on the grid — ie 9,1; 1,9; 1,1; 5,5; and 9,9 — represent the basic managerial styles, but many other mixtures of styles in varying proportions could be identified.

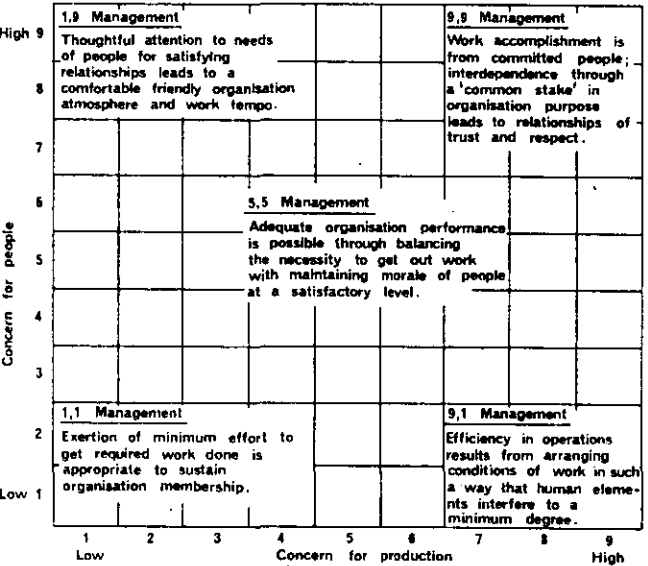


Figure 1: the managerial grid

(i) The 9,1 style

This style involves a high concern for production and a low one for people, but it is probably the most commonly occurring style. Like all the basic styles except 9,9 it assumes inevitable contradiction between the organisational requirements of production and people's needs.

In the extreme such a manager would be described as an exacting taskmaster; one who drives himself and his workforce too. Attention is concentrated on organising the work itself.

This style is authoritarian; people are expected to do what they are told. The boss plans, and subordinates execute. Direction and control are key managerial concepts.

It is assumed that people do not like work, that they are not capable of organising their own work, and that to allow them any measure of discretion would weaken the line of authority. When mistakes occur they are explained away by human error; the culprit must be found and punished. The supervisor considers that he, and he alone, should make all the decisions.

This style assumes that people are paid to work, and provided they are well supervised there will be no problems of morale. If such problems arise, they arise from soft leadership.

## 3.11(2) MANAGEMENT

All communication is in writing, however minor; in this way responsibility for mistakes can be correctly allocated and punishment administered. Communication upward is limited to reporting work done and deviations from expected results.

**Conflict avoided** Interpersonal competition is discouraged as being disruptive of progress and growth. Impersonal competition, eg with other organisations, is encouraged.

Creativity is encouraged at high level in the organisation but is discouraged in subordinates as it is regarded as a challenge to authority. Such creative thinking is thus sometimes directed at defeating the system.

**Disillusion** Managers are likely to be fully committed to the goals of the organisation, but subordinates are likely to feel that they are being 'used' and therefore remain uncommitted.

### (ii) The 1.9 style

This style involves a low concern for production and a high one for people.

**Sociability** The needs of people come first and conditions are arranged so that personal, social and welfare needs are met. Effort is concentrated on making arrangements that will enable people to fit in to them with comfort, ease and security.

**Support** Organisational demands for production are felt to be often harsh, overdemanding and unnecessary. People should be shown, not commanded; they should be supported, not goaded. The superior will thus have willing and appreciative followers.

Pressure on subordinates followed by disciplinary action when mistakes occur is avoided since it is assumed that it produces tension which leads to more errors.

**Freedom** Rules about arrival and departure times are disregarded, tea breaks and lunch hours extended and occasional absences unexplained.

Imposing goals on others is unacceptable, but management by objectives is all right, particularly as close supervision is not then needed.

**Harmony** Written communication is discouraged, and only success is reported upwards.

One of the manager's primary aims is to be accepted by his subordinates, and he thus avoids disagreements and conflict, but promotes harmony instead.

### (iii) The 1.1 style

**Passivity** This style involves no concern for either production or people; it is passive. A manager who adopts such a style is not really managing at all; he has accepted defeat. He is really only passing messages to his subordinates from his superiors and vice versa.

**Personal survival** Mistakes in others are expected and are overlooked. The manager will know the rules and will follow them to avoid being blamed for any errors that occur. Conflict of any kind is avoided. Personal survival is the primary aim.

### (iv) The 5.5 style

**Compromise** This style involves a moderate concern for both production and people; conflict is resolved through compromise.

It is the manager's job to plan, direct and control, but it is important to get understanding from employees too, and to elicit suggestions from them by encouraging them to think about their work constructively.

**Bureaucracy** The manager leads, motivates and communicates, instead of commanding or directing. Mistakes are dealt with firmly, and compliance with traditions, precedents and rules is expected. Organisational objectives are balanced: a reasonable level of achievement coupled with job satisfaction and security.

**Participation** Work groups are a feature of this style of management. They encourage participation, and produce ideas.

Both the formal and informal organisation are considered equally necessary since the informal is a natural consequence of the formal.

**Balance** A 5.5 approach seeks to achieve realistic outputs and fair and equitable solutions to conflict between people.

### (v) The 9.9 style

**Integration** This style involves a high concern for both production and people. It does not assume an inevitable conflict between organisational requirements and people's needs. Organisational and individual goals merge together.

Effective integration of production and people is achieved by involving them in determining conditions and strategies of work.

**Excellence** This approach seeks the best and most effective solution to every problem, not merely a workable one.

Accomplishment and contribution together characterise the 9.9 style. The manager's task is to see that sound decisions are made by those most competent to do so rather than to make them all himself. Custom and precedent are not regarded as infallible guides but are followed if considered to be the best practice.

**Constructive criticism** Mistakes are believed to occur through misunderstandings and faulty information. They are investigated to find the true cause which is then eliminated to prevent the mistake recurring. Communication is open, authentic and candid. Conflict is resolved by confronting the problem directly with everyone involved.

A 9.9 style improves organisational achievement and internal group relationships, reduces interpersonal conflicts, and contributes to an increased individual effort.

## 11.7 Choosing a leadership style

**Self-assessment** It is possible, by examining the various basic styles which are discussed in paragraphs 11.4 and 11.6, for each manager to identify his own style.

**Style change** *The managerial grid* includes a specific test for this purpose. Having identified that style, its advantages and disadvantages can be considered, and a change to a more appropriate style attempted if that is thought to be desirable.

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# A Municipal Engineering Data Sheet

Data Sheets 8.11 (1) and (2) Leadership. Commentary

There must be some doubt about the extent to which leadership as such is displayed in a work situation. Nevertheless, the writer believes that in municipal engineers' departments there is considerable opportunity to exercise leadership as distinct from direction.

If both superiors and subordinates understand more about leadership, it is likely to result in better relationships and greater cooperation. Most people probably think on similar lines to the 'great men' theory, and it will be encouraging to many of them to know that such a theory has little substance.

It will provide satisfaction, and explain what may otherwise be a conflict situation, to know that the designated 'leader' will not always be the real leader. It may help to further discredit the authoritarian style of leadership as a normal style in work situations.

# MANAGEMENT

## FILE REFERENCE 8.12 Individuals

*Managers make assumptions and generalisations about individuals which are implicit in the way they manage (data sheet 8.02 (2)). Much organisational decision-making is based on the assumption that people are alike, or that if they are not, they ought nevertheless to conform. This data sheet examines some basic ideas about people as individuals, and their effect on organisation.*

### ● INDIVIDUALS

#### 12.1 Subordination

**Unselfishness** One of Henri Fayol's (see *Bibliography*) general principles of management states that the general interest must prevail over the individual interest (data sheet 8.03, 3.1(ii)(f)). He wrote: '... in a business the interest of one employee or group of employees should not prevail over that of the concern, the interest of the home should come before that of its members and the interest of the State should have pride of place over that of one citizen or group of citizens.'

'It seems that such an admonition should not need calling to mind. But ignorance, ambition, selfishness, laziness, weakness and all human passions tend to cause the general interest to be lost sight of in favour of individual interest. ...'

**Commitment** However, Chester I Barnard in *The functions of the executive* (Harvard University Press, 1938) wrote that the commitment of individuals to the organisation would vary from maximum willingness to opposition or hatred. He maintained that most people would be negative in their commitment, and that an individual's commitment will vary with time. Willingness to co-operate is the result of satisfactions or dissatisfactions obtained, and all organisations depend, he said, on the subjective assessment which the members make of them.

**Individualism** Mary Parker Follett (see *Bibliography*) stated: 'We can never reconcile planning and individualism until we understand individualism not as an apartness from the whole, but as a contribution to the whole.' Thus Fayol's principle cannot be applied rigidly, and the needs of individuals should be taken into account in managing organisations.

#### 12.2 The nature of man

Koontz and O'Donnell (see *Bibliography*) set out seven conclusions about the nature of man which they consider are of the utmost importance to managers. Summarised these are:

**Selfishness** (i) The individual is the primary concern of man. Man looks after himself both in the extremities of life or death and in the modern affluent society. It is he who wants preferment, who wants to win.

**Satisfaction** (ii) The individual will work to satisfy the demands of his basic nature if the benefits exceed the costs. Man enjoys work if the effort is directed towards satisfying the demands of his complex nature.

**Leadership** (iii) The individual can be led. Man responds to leadership. He can be persuaded through many devices to take the desired road, but the devices themselves must be selected, tuned, and timed to the individual's need to satisfy his basic nature.

**Sociable** (iv) The individual wants to live and work in a social environment. Although this is true most of the time,

there is in the individual a need for solitude. Man may be largely a social animal, but he is not entirely so.

**Co-operation** (v) The individual helps to create institutions which serve the needs of their memberships. There are many needs that man alone cannot satisfy; they can be achieved only through co-operative effort. If they promise a surplus of benefits over costs, he is likely to accept the implied limitations upon his individuality.

**Difference** (vi) There is no average man. People are not all alike. Natures are different, and an individual's own nature may differ from time to time.

**Stretching** (vii) The individual rises to the challenge of his full capabilities. Man is impatient to use his abilities to their full extent. He resents the lack of opportunities to apply his knowledge and skills and to shoulder the responsibility for results.

#### 12.3 The development of the individual

A summary of the views of C Argyris that are set out in *Understanding organisational behavior* (Tavistock 1960) is that:

'... the development of the human personality can be hypothesized to follow the directions and dimensions outlined in the following model. It is hypothesized that human beings in our culture:

**Passivity** '(i) Tend to develop from a state of passivity as infants to a state of increasing activity as adults.

**Dependence** '(ii) Tend to develop from a state of dependence upon others as infants to a state of relative independence as adults. Relative independence is the ability to "stand on one's own two feet" and simultaneously to acknowledge healthy dependencies.

**Variety** '(iii) Tend to develop from being capable of behaving only in a few ways as an infant to being capable of behaving in many different ways as an adult.

**Maturity** '(iv) Tend to develop from having erratic, casual, shallow, quickly dropped interests as an infant to having deeper interests as an adult. The mature state is characterized by an endless series of challenges, where the reward comes from doing something for its own sake.

**Lengthening time-scale** '(v) Tend to develop from having a short time perspective (ie the present largely determines behavior) as an infant to a much longer time perspective as an adult.

**Ambition** '(vi) Tend to develop from being in a subordinate position in the family and society as an infant, to aspiring to occupy an equal and/or superordinate position relative to their peers.

**Self-awareness** '(vii) Tend to develop from a lack of awareness of self as an infant to an awareness of and control over

## 8.12 MANAGEMENT

self as an adult. The adult who tends to experience adequate and successful control over his own behavior tends to develop a sense of integrity . . .

But basic to his model is the assumption that all human beings are incomplete in themselves. They gain their wholeness, he says, through interaction with others.

### 12.4 Behaviour

Three generalisations can be made about behaviour and these are defined by Harold J Leavitt (see *Bibliography*) as follows:

Causality

(i) The first idea is that of causality—the idea that human behaviour is caused, just as the behaviour of physical objects is caused by forces that act on those physical objects. Causality is implicit in the beliefs that environment and heredity affect behaviour and that what is outside influences that which is inside.

Direction

(ii) The second idea is that human behaviour is not only caused but is also pointed towards something; that behaviour is goal-directed, that people want things.

Motivation

(iii) The third idea is that of motivation; that underlying behaviour there is a push, a motive, a want, a need, or a drive.

It is helpful, says Leavitt, to consider these three concepts as forming a closed circuit of cause—motive—(behaviour)—goal (see fig 1). Thus achieving a goal eliminates the cause, which in turn eliminates the motive. It must be remembered, however, that many psychological goals are neither finite nor specific as are physical goals, eg prestige goals seem to be ephemeral and boundless.

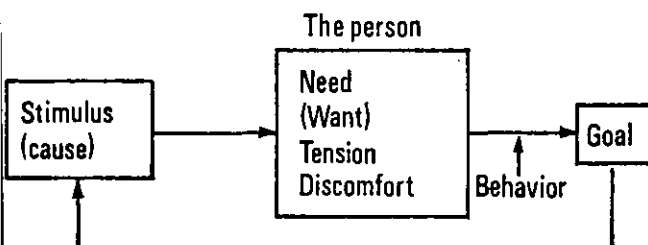


Figure 1: A basic model of behaviour

### 12.5 Thinking styles

Numeracy or literacy

Just as individuals differ in their needs and feelings, so their thinking styles differ. Leavitt (*op cit*) states that we all think but we think differently. Some children, he says, have a natural skill at numbers, but others have intuitive skills or are good with words. Some people are said to have logical, orderly minds, others to be tremendously imaginative. Such differences in the ways in which people think and solve problems, says Leavitt, are both real and important. 'To some extent these differences may be inborn, and to some extent they are related to general intelligence. But it is also quite clear by now that the whole process of formal and informal education strongly influences the particular "style"

Styles

of our later thinking, if not its quality.'

'The engineer's professional education teaches him not only facts but manners of thought, analytic manners of approaching problems. An arts education teaches thinking manners too, but probably quite different ones; and those manners are likely to carry over into other parts of life. Moreover, such differences in style may lead to interesting and significant organisational problems. For instance, individuals in an organisation who think in one "language" may have trouble communicating with individuals who think in other languages.' . . . certain occupational groups—engineers, most scientists, accountants—tend to score higher on analytic than on imaginative tests, while art students and salesmen tend to score higher on imaginative tests.' Neither type of thinking is 'better' nor 'worse' than the other; both are needed but communication between the two can be very difficult.

### 12.6 The individual and the organisation

Job description

It is important to the individual that his role and status within the organisation should be clearly defined so that he and his colleagues are aware of their respective positions, or insecurity and frustration may result. Nevertheless mature and stable individuals are more able to cope with problems in organisations as in life itself. But Argyris suggests (*op cit*) that the characteristics of the formal organisation (see *index, data sheet 8.00*) are incongruent with those which relatively mature human beings in our culture are thought to desire. He believes that mutual adaptations take place in practice within organisations through which the organisation modifies the individual's personality and the individual in turn modifies the formal organisation.

Incongruence

Personal identity

To the individual a job is more than just a function; it is a sense of purpose, a set of interests, a way of life, a value system, and above all, a personal identity (Huneryager and Heckman, *Human relations in management* (2nd ed), South-western Publishing Co, 1967).

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## A Municipal Engineering Data Sheet

Data Sheet 8.12 Individuals. Commentary

The need for this sheet stems from the fact that it is very important to write one or more fairly detailed sheets on groups. It seems logical to the writer that a sheet on individuals should precede those on groups. The main problem is where to draw the line on individuals. Eventually, the writer decided to leave out the psychology matters such as frustration, stress, etc., and these can be dealt with elsewhere.

What is left is fairly straightforward and should be readily acceptable to readers. It should help them towards understanding some of the reasons why individuals are different, and need different treatment by managers, though of course there is a limit to being able to apply this in practice.

The items on different thinking styles (para. 12.5) should assist readers to begin to understand the other man's point of view.

# MANAGEMENT

## FILE REFERENCE 8.13 GROUPS

*The significance that groups have in the working environment is now widely recognised. Organisations ('secondary' groups) are composed of small ('primary') groups. People who come together to undertake an activity jointly, tend naturally to form a group which will set its own standards of behaviour and output. Members of cohesive groups will enjoy working together better than as individuals and are less likely to be absent.*

### GROUPS

#### 13.1 Definition

**Interaction** Professor W J H Sprott (*see Bibliography*) defined a group as '... a plurality of persons who interact with one another in a given context more than they interact with anyone else'. He included the phrase 'in a given context' because an individual may be a member of several groups; eg he will be a member of at least one work group in his employment, a member of his family group at home, and a member of, say, his football team when he is playing football.

**Primary group: face-to-face contact** J A C Brown in *The social psychology of industry* (Penguin Books, 1954) states: 'The primary group is the instrument of society through which in large measure the individual acquires his attitudes, opinions, goals, and ideals; it is also one of the fundamental sources of discipline and social controls'. It is the small primary group which is most significant for managers. Miller and Rice (*see Bibliography*) state that groups of up to 16 members retain the essential characteristics of small face-to-face groups, in which members can sustain close and continuous personal relationships. 'The small face-to-face group provides a boundary within which the member can be known and can feel secure; within which, as an individual, he can seek reinforcement and help; in return, however, he has to conform to the patterns of behaviour imposed by the group, and contribute to the different assumptions that make up the group culture.' As long ago as 1956 David Watson, county surveyor of Warwickshire, drew attention to the significance of working groups and management's dependence on them in 'The impact of full employment' (*IME Journal*, vol 83).

#### 13.2 The Hawthorne studies

**Relay assembly test room experiments** It was Elton Mayo [*data sheet 8.01, 1.4(ii)*] who inspired the well-known studies at the Hawthorne works of the Western Electric Company. He is generally considered to have been responsible for introducing social science concepts into studies of management. The Hawthorne studies began with an investigation into the effect of improved lighting on output. In one group the intensity of lighting was varied from time to time; in the control group it remained constant. The output of the experimental group rose steadily even when the amount of light was reduced; paradoxically the output of the control group also rose steadily even though there had been no change in lighting. It became necessary therefore to have a more comprehensive investigation of factors affecting output, and thus began the Relay assembly test room experiments. The Hawthorne experiments lasted five years and during this period numerous changes in working conditions were made, including changes in

working hours, in rates of pay and in rest breaks. Output rose following most changes even when these involved a return to the original working conditions.

**Participation** In *The human problems of an industrial civilisation* (Macmillan, 1933), Mayo said: 'The records of the test room showed a continual improvement in the performance of the operators regardless of the experimental changes made during the study. It was also noticed that there was a marked improvement in their attitude toward their work and working environment. This simultaneous improvement in attitude and effectiveness indicated that ... we could more logically attribute the increase in efficiency to a betterment of morale than to any of the alterations made in the course of the experiments. 'Over and over again the girls expressed their contentment with the test room and its pleasanter, freer, and happier working conditions. ...' The girls '... had become participating members of a working group with all the psychological and social implications peculiar to such a group.'

#### 13.3 Conformity

**Moderation** People's behaviour is influenced very much by members of a group; they tend to become less extreme in their own judgments and to respond to the collective value judgments of the group because they fear the isolation that is the likely result of not conforming to group standards. Generally members will prefer co-operation to competition within the group and will adjust their work effort accordingly since they fear the displeasure of the group more than that of their superiors [*data sheet 8.02(1), 2.2(ii)(c)*].

**Group norms** Group norms for output are such that members will restrict their production below what they could reasonably achieve, even where incentive schemes are operating, and even if they do not individually fully support the standards set. Arnold Tannenbaum in *Social psychology of the work organisation* (Wadsworth, 1966) quotes three propositions from research by others which he believes suggest that members implicitly or explicitly demand conformity:

**Attraction** (i) The more attractive a group is to members, the more likely members are to change their views to conform with those of others in the group.

**Rejection** (ii) If an individual fails to conform, the group is likely to reject him; and the more attractive the group is to its members, the more decisively they will reject this individual.

**Deviation** (iii) Members are more likely to be rejected for deviation on an issue that is important to the group than on an issue that is unimportant.

## 8.13 MANAGEMENT

### Hierarchy

Conformity does not imply that all members of the group are equal; when a group has become established a characteristic pattern of interaction is found, according to Michael Argyle in *The psychology of interpersonal behaviour* (Penguin Books, 1967). He says that low status members at the bottom of the hierarchy talk little, they address the senior members politely and deferentially, and little notice is taken of what they have to say. A person's position in the hierarchy is primarily a function of how useful he has been in the past, he says. Members of groups are expected to contribute to the setting of output norms and standards of behaviour, and subsequently to support group decisions.

### 13.4 Formal and informal groups

#### (i) Formal

#### Acknowledged leadership

The formal work group, ie one that is established by the organisation, works most effectively if the supervisor who is appointed by the organisation is also the acknowledged leader of the group. Leaders need to be able to contribute towards the achievement of group goals, and to assist in satisfying the needs of individuals.

#### Stability

A problem of high labour turnover in refuse collection gangs at Derby CBC was investigated by J A Dukes of the Local Government Operational Research Unit and published in *A problem of labour turnover*, 1966.

Three possible causes of the high turnover had been repeatedly suggested: low pay; low social status; and the large number of alternative jobs available in the town. The results of the investigation showed that these were not the causes of the problem which were founded in the need for such gangs to form stable groups if they are to function satisfactorily.

#### (ii) Informal

The discovery of the informal group by research workers such as Elton Mayo was a most important one (*data sheet 8.02, 2.9*). The informal group is the link by which the individual becomes an effective member of the organisation, but the group can work for or against the aims of the organisation. According to Tannenbaum (*op cit*): 'Organisations are full of informal face-to-face groups that offer satisfying interpersonal relations and support to their members in the face of frustrations in the job'.

#### Effective leadership

Effective leadership of groups depends on the ability of the leader to create and maintain group standards and solidarity [*data sheet 8.11(1), 11.3*]. However, leadership in well-knit groups may change with the problem being faced or the task being undertaken. In some groups authoritative leadership may be tolerated, or even welcomed.

#### Process

The realisation that groups exist and that their members feel greater loyalty to the group than to the organisation has led to a fundamental rethinking of the whole management process.

### 13.5 Group dynamics

Massachusetts Institute of Technology, MIT

Group dynamics is a branch of knowledge that is concerned with human behaviour and social relationships, according to Cartwright and Zander (*see Bibliography*). They define it as '... a field of inquiry dedicated to advancing knowledge about the nature of groups; the laws of their development, and their interrelations with individuals, other groups, and larger institutions'. It began as an identifiable field of inquiry in the United States towards the end of the 30s. Kurt Lewin, who coined the term 'group dynamics', and who was associated with its origin as a separate speciality, formed the Research Center for Group Dynamics at the Massachusetts Institute of Technology in 1945.

### 13.6 Organisational design

#### Structure

The importance of the group in the devising of a structure for an organisation has led people to advocate building the organisation structure around groups, such as Rensis Likert's System 4 [*data sheets 8.02(2), 2.7(iii); and 8.04(2), 4.6*]. His reason for doing so is the superiority that, in his view, groups have over individuals in decision-making and supervision.

#### Acceptance of change

Participative decision-making, generally, leads to decisions being made which are more acceptable and often more innovative [*data sheets 8.11(1), 11.4(e); and 8.11(2), 11.6(iv)*]. One reason for this is that a group can bring a greater variety of knowledge and experience to problem-solving than an individual can. Another is that participation has a good effect on morale, loyalty and acceptance of change.

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## A Municipal Engineering Data Sheet



Data Sheet 8.13 Groups. Commentary

It was a considerable surprise to the writer when he first read (in 1968) about the Mayo experiments in the Hawthorne works. Since then, he has read a good deal about groups and one soon realises the significance of knowing that they exist (though often unknown to their members) in helping one to understand what is happening in a particular situation, e.g. in a chief officers' group, in a committee, or in social groups outside the work situation.

The writer delayed writing of them until now because he thinks this kind of knowledge is rather heady stuff for hardheaded engineers who are quite likely to reject it as irrelevant to their scene. It is perhaps unfortunate that much of the work coming out of studies of group dynamics appears contradictory and is very experimental, e.g. work on leadership, since this groping for truth may be misunderstood by the manager who needs answers today. For this reason the writer has played down the group dynamics content of this sheet but will write future sheets on subjects such as motivation (leadership has already been done) which fall within the group dynamics sphere.

The knowledge that most of us need about groups in day-to-day local government is not wide and the writer thinks this sheet covers the main points.

# MANAGEMENT

## FILE REFERENCE 8.14 Motivation

### ● MOTIVATION

#### 14.1 Significance

Performance	In their introduction to <i>Management and motivation</i> (see <i>Bibliography</i> ) Vroom and Deci state that the performance of people at work varies greatly and that the best worker in a group may be contributing as much as ten times what the poorest is contributing. Performance at work, they say, is composed of two factors: skill in the work, and motivation to exercise that skill. Performance is not the sum of those two factors, but is their product. 'Increasing the motivation of persons high in ability will lead to a greater increase in performance than increasing the motivation of persons low in ability. Similarly, there is more to be gained from increasing the ability of individuals who are high in motivation than of individuals who are low in motivation. In short, the effects of each of these variables (ability and motivation) on performance is dependent upon the existing amount of the other.'
Ability	
Element	Brech ( <i>data sheet 8.03, 3.3(i)</i> ) considers that motivation is one of only four elements which together comprise management.
Organisational theories	March and Simon ( <i>data sheet 8.02(2), 2.7(i)(b)</i> ) define motivation as an area of human behaviour which is the basis for one of three broad categories of organisational theory. Likert ( <i>data sheet 8.02(2), 2.7(iii)</i> ) includes a capacity to motivate as one of the four conditions necessary in successful organisations.

#### 14.2 Theories of motivation

	<b>(i) A H Maslow</b> What induces people to work? In response to this question different people would give different answers, eg to buy food, to pay rent, to acquire property, to be independent, for status, and for job satisfaction. These several 'wants', or 'needs', or 'drives' ( <i>data sheet 8.12, 12.4(iii)</i> ) are said by Maslow ( <i>Psychosomatic medicine</i> , vol 5, 1943) to be arranged in a hierarchy of needs, ie the appearance of one need usually rests on the prior satisfaction of another need. He developed a theory of motivation in a later paper published in the <i>Psychological review</i> , vol 50, 1943. Summarised, the basic needs are: (a) eg hunger and thirst (b) job security, protection from violence and crime, stability, order (c) love, affection, belongingness (d) self-respect, self-esteem, the esteem of others firmly based on real capacity and achievement, independence and freedom, reputation and prestige (e) the desire for self-fulfilment, to become everything that one is capable of becoming. Tentatively Maslow included another need which he thought may only affect people of relatively high intelligence: the desire to know, to be aware of reality, to get at the facts, to satisfy curiosity. This he developed into yet a further need: the desire to understand, to systematise, to organise, to analyse, to look for relations and meanings.
Hierarchy	
Needs:	
physiological safety	
love esteem	
self-actualisation	
Knowledge and understanding	

*The very definition of management—getting things done through other people (data sheet 8.01)—is imbued with the concept of motivation, that is inducing people to do what is needed by supplying the necessary motive. This sheet discusses some of the ideas and theories which contribute to an understanding of motivation.*

	In the real life situation the average person would find all of his basic needs partially satisfied and partially unsatisfied at any one time. Nevertheless a 'higher' need is unlikely to emerge in a person until the 'lower' need is substantially satisfied; such a satisfied need ceases to be a motivator. Most people are unlikely to be aware of these needs in themselves, or the extent to which they have been satisfied.
Motivating factors	<b>(ii) Frederick Herzberg</b> Studies by Herzberg and his colleagues (see <i>Bibliography</i> ) have shown that certain factors lead to job satisfaction and these they describe as motivators. They are: achievement, recognition of achievement, intrinsic interest in the work, responsibility, and advancement. Other factors, relating to a healthy work environment, are termed <i>hygiene factors</i> because they serve primarily to prevent job dissatisfaction. They are: company policy and administrative practices, supervision, salary, interpersonal relationships, and working conditions. The factors which lead to job satisfaction (motivators) are separate and distinct from those that may lead to job dissatisfaction (the hygiene factors). Thus the opposite of job satisfaction is not job dissatisfaction, but rather <i>no</i> job satisfaction, and the opposite of job dissatisfaction is <i>no</i> job dissatisfaction, not job satisfaction. Herzberg suggests in 'The motivation-hygiene concept and problems of manpower' ( <i>Personnel Administration</i> , vol 27) that while there is nothing wrong in providing the maximum of hygienic benefits for employees, it is quite wrong to view human needs solely in those terms. But he suggests that not enough attention has been given to the motivating factors.
Hygiene factors	
Job satisfaction	
	<b>(iii) Douglas McGregor</b> In <i>The human side of enterprise</i> (see <i>Bibliography</i> ) Douglas McGregor sets out what he describes as 'oversimplified generalisations' about motivation. Similar to those of Maslow, summarised they are: (a) hunger, thirst, rest, exercise, shelter, protection from the elements (b) protection against danger, threat, deprivation (c) belongingness, association, acceptance of one's fellows, giving and receiving friendship and love (d) (i) those that relate to one's self-esteem: self-respect, self-confidence, autonomy, achievement, competence, and knowledge (ii) those that relate to one's reputation: status, recognition, appreciation, the deserved respect of one's fellows (e) realising one's own potentialities, continued self-development, being creative. A person whose lower level needs are satisfied is no longer motivated to satisfy such needs, and
Needs:	
physiological	
safety	
social	
egoistic	
self-fulfilment	

## 8.14 MANAGEMENT

these needs are satisfied in most people at work. Thus the emphasis should be moved from satisfying the lower needs, to satisfying social and egoistic needs. Unless there are opportunities to satisfy these higher level needs at work, people will feel deprived, and their behaviour will reflect this dissatisfaction. Management, McGregor says, cannot provide a man with self-respect, or the respect of his fellows, or self-fulfilment, but it can create the right conditions in which he can himself satisfy some or all of these needs. He says that 'People, deprived of opportunities to satisfy at work the needs which are now important to them, behave exactly as we might predict—with indolence, passivity, unwillingness to accept responsibility, resistance to change, willingness to follow the demagogue, unreasonable demands for economic benefits.'

It was his views on motivation, among others, which led McGregor to formulate his Theory Y (*data sheet 8.02(2)*), whose central principle is the creation of conditions through which the members of an organisation can best achieve their own goals by directing their efforts towards the success of the enterprise.

### 14.3 Incentives

Carrot and stick

The use of rewards and threats is the traditional approach to motivation. Either rewards are offered—eg increased pay, promotion, shorter hours—or threats are made—eg dismissal, relegation to a lower status, retarded promotion. However, individual performance may depend more on group norms than on individual preferences (*data sheet 8.13, 13.1*).

Rewards

Edward E Lawler III, in 'Job design and employee motivation' (*Personnel psychology*, 1969), defines two kinds of rewards: those which are extrinsic to the individual, and those which are intrinsic.

Extrinsic

(i) These are part of the job situation and are given by others. They satisfy lower level needs.

Intrinsic

(ii) These are internally mediated by the person himself. They satisfy higher level needs such as self-esteem and self-actualisation. They are excellent motivators because they are likely to arise soon after the activity itself, and because they are highly valued.

Money

Increased pay, often in the form of incentive bonus schemes, is frequently used in an attempt to motivate people to produce more. However, the possibility of having increased pay does not act as a motivator for everyone, and even when it does so act its effect is likely to be shortlived. Nevertheless an individual has a conception of his own value in terms of status and pay, and will be dissatisfied until his actual position equates closely with the perceived value. As a motivator, money is seen as being most useful as a means of achieving lower level needs such as food, shelter, security and independence. In Lawler's terms money is an extrinsic reward, and in Herzberg's is a hygiene factor.

Job design

Lawler states that 'Job content is the critical determinant of whether employees believe that good performance on the job leads to feelings of accomplishment, growth and self-esteem'. 'Job content is important . . . because it serves a motive-arousal function where higher-order needs are concerned and because it influences what rewards will be seen to stem from good performance.'

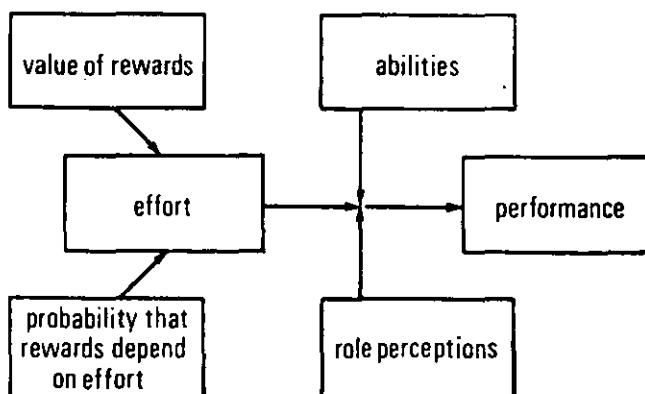


Figure 1: Diagram of the theoretical model

### 14.4 A theoretical model

Edward E Lawler III and Lyman Porter suggested a theoretical model (see fig 1) which links attitudes of managers to task performance, in 'Antecedent attitudes of effective managerial performance' (*Organisational behavior and human performance*, vol 2, 1967). The authors ask: what factors determine the effort a person puts into his job, and what factors affect the relationship between effort and performance?

Effort

(i) Effort is the amount of energy an individual expends in a given situation, and it is dependent on motivation. Two factors determine the effort that a person puts into a job: the value of rewards (of various kinds), and the probability that rewards depend on effort. This is the individual's assessment of the likelihood that expected rewards will follow certain levels of effort. The higher the value of these two factors (motivators), the greater will be the effort expended.

Performance

(ii) Performance is defined by the authors as 'the amount of successful role achievement'. The two variables which, when combined with effort, affect performance, are abilities and role perceptions. Abilities include intelligence, manual skills, and personality traits, and are relatively independent of immediate environmental circumstances. Role perceptions are the kinds of activities and behaviour the individual feels he should undertake to perform the job successfully.

Abilities

Role perception

Interaction

Thus the model is based on the hypothesis that both abilities and role perceptions interact with effort to produce performance. If it is desired to modify performance through changing attitudes, the three crucial attitudes are the two motivational ones, viz the value of rewards and the probability that rewards will depend on effort, and role perceptions.

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## A Municipal Engineering Data Sheet

It would seem to the writer that the only real way of increasing motivation in people is to create an atmosphere which suits them, rather than to try to motivate them directly with encouragement or threats of the withdrawal of privileges, etc. On the whole, the Services (and schools) seem good at creating esprit-de-corps.

Why is it, though, that some people are capable of being motivated and others apparently not so?

Also, is it not contradictory to talk of 'creating the right atmosphere' (by which we imply a favourable one) when we know that we produce our best work under pressure, and some people - artists and writers - produce their best work under what would normally be considered very bad conditions? Perhaps the answer is simple - creating the right atmosphere should not imply favourable conditions necessarily.

The hierarchies of Maslow and McGregor clearly have some validity which can be assessed directly by people in their own lives.

The theoretical model of Lawler and Porter is thoughtful yet simple and should help us to understand the problem in ourselves and others.

It is noticeable that we tend to collect around ourselves, people who are like us and we know quite a bit about this as it affects groups, and indeed motivation.

However, we are often encouraged to recruit the chap who is different and who will 'shake up' the organisation by giving it new insights. That is all very well so long as it is confined to people who otherwise fit in; i.e. obey the unwritten rules. Care needs to be taken to ensure that the 'unwritten' rules' do not involve the slightest suspicion of malpractice. John Dearlove's book on Politics and Policies shows clearly how new councillors must 'serve an apprenticeship' and 'get to know the ropes'. Even after that, new ideas may be unwelcome.

There is no good reason in the writer's view for recruiting people who do not fit in, and to whom the unwritten rules are unlawful. That is to say that he would support the introduction of knowledge, new ideas and new insights, etc., but would oppose change in the 'social' aspects of the group - e.g. the management team or its equivalent.

MANAGEMENT

● INFORMATION

15.1 Definitions

Knowledge	Information is defined in the Oxford English Dictionary as <i>inter alia</i> 'knowledge communicated concerning some particular, fact, subject or event. . . . Datum is there defined as 'A thing given or granted; something known or assumed as fact, and made the basis of reasoning or calculation; an assumption or premiss from which inferences are drawn.' Thus information includes data, but Keeling points out ( <i>see bibliography</i> ) that although administrative systems may generate vast quantities of data, there is often a lack of information. In management practice the term 'data' usually refers to numerical data (statistics) which are raw, unprocessed, and not yet evaluated. It is necessary for the manager to be satisfied about the basis for the collection of data, and the statistical method used in processing it.
Data	In the view of Dr Georges Anderla, 'Information is now recognised for what it is, ie a vehicle for the transfer of knowledge and a basic resource, an essential ingredient of both the decision-making process and production processes of all kinds' ( <i>The OECD Observer</i> (France) April 1973)
Statistical method	
Basic resource	

15.2 The need

Evaluation	Information is required to reduce uncertainty in four main activities: (i) to present an accurate picture of the state of an activity or a stated need [ <i>data sheet 8.30(1); 30.4 (vii)</i> ]; to identify changes in the needs and problems of a particular locality [ <i>data sheet 8.30(1); 30.4 (i)</i> ]; to present and evaluate alternatives [ <i>data sheet 8.30(1); 30.4 (v)</i> ];
Prediction	(ii) to use for forecasting trends (eg car ownership) in both the short-term and the long-term, and their effect on demand (eg road space and car-parking);
Decision-making	(iii) to assist analysis [ <i>data sheet 8.10(1); 10.3 (ii) (b)</i> ]; to make the best decision [ <i>data sheet 8.30(2); 30.12 (i)</i> ]; to allocate resources [ <i>data sheet 8.04(3); 4.10 (ii) (c)</i> ]. However, as R G S Brown points out in <i>The administrative process in Britain</i> (Methuen 1971), an essential part of effective decision-making involves the use of incomplete data. It could be said that a successful manager is one who consistently makes good decisions on the minimum of information.
Control	(iv) to monitor progress and control results [ <i>data sheet 8.30(2); 30.9 (ii) and 30.10</i> ]. There is a need for a flow of current information on resource inputs and outputs to enable the output achieved to be assessed against the output sought (Keeling, <i>see bibliography</i> ).

15.3 Process

Uncertainty	The process of reducing or dispelling uncertainty is described by W G Scott in 'Decision concepts' ( <i>Organisation theory</i> , Irwin, 1967) a reading from which is included in <i>Decisions, organisations and society</i> . (Penguin Books in association with the Open University Press). Scott says 'Uncertainty ranges between total ignorance at one end of an extreme to either, but not including, risk or certainty at the other.
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FILE REFERENCE 8.15  
Information

Information is a basic requirement for managing; it is required to evaluate the present state of an activity or need, for prediction, for decision-making, and for control. Information should be relevant to the purpose for which it is to be used, and its quality is more important than its quantity. Thomason (*see bibliography*) suggests that the manager's tasks are concerned essentially with information processing. It is his task to ensure that information flows are organised and employed.

We dispel uncertainty with information.  
'. . . information, although imperfectly measured and qualitatively defined in an administrative setting similarly structures an uncertain environment for the decision-maker. It permits him to make better decisions assuming effectiveness criteria are measured by the relationship between payoffs and goals. Therefore the decision-maker wishes to reduce uncertainty or, if possible to convert it to a state of either certainty or risk. That this is accomplished through the medium of information is highlighted in Fig 1.'

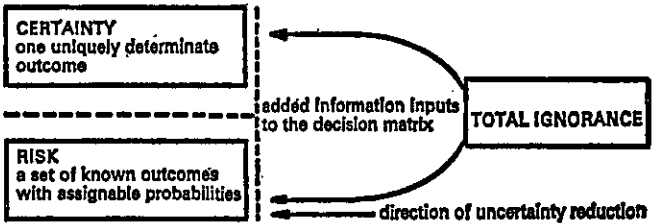


Figure 1: Information and uncertainty reduction

Inputs	This figure requires several observations: '(i) The nature of "added information inputs" is data concerning outcomes and probabilities of given strategies. Suppose a decision-maker begins acquiring information at the point of "total ignorance" or at some other point to the left of it. He may be unsure at this time whether added information will lead him to the risk state, the certainty state, or, for that matter, leave him at some advanced condition within the uncertainty state.
Certainty or risk	'(ii) Of course it is clear, or should be, that a decision-maker may never "cross the dotted line" to either certainty or risk states regardless of how much information he acquires. More information may improve decisions within the uncertainty state. Beyond this the decision-maker may never learn what the nature of a particular decision is. But he may avoid the error of using risk assumptions for a decision which more correctly lies in uncertainty.
Incremental progress	'(iii) The amount of information the decision-maker actually acquires depends on some marginal (or satisficing) calculus, in which he compares information cost to the value of uncertainty reduction. Naturally, we must think incrementally in terms of so many units of information for so many units of uncertainty reduction. It is unlikely that we can go from say total ignorance to some arbitrarily desirable point of uncertainty in a single leap.
Satisficing	'The need for information may be as much psychological, in view of the qualitative character of most administrative decisions, as it is technical in some quantitative sense. This then would suggest that the need for information is satisfied at points other than where "the cost of information equals the value of uncertainty reduction." Most of the literature leads us to believe that these points are somewhere before the point of maximization.' (This is the implication in March and Simon. <i>Organisations</i> , Wiley, 1958).

## 4 Accuracy

**Statistics** Statistics generally are regarded as not very meaningful and yet financial statistics are considered accurate and useful; but information of all kinds needs to be processed or analysed before it can be of use in management. During this process value judgments are made which may have the effect of giving a bias to the conclusions reached.

**Interpretations** Dunsire (*see bibliography*) states: 'Information is necessarily filtered and selected in many ways, and knowledge may be "stipulated fact"—the "official version"—or so summarised that the uncertainties present in the raw data are removed and what are really interpretations are treated as "facts".'

## 5 Sources

**Assembling information** The Bains report (*The new local authorities, management and structure* HMSO 1972) states that the Local Government Bill '... gives to the county councils a wide permissive power to carry out research and collect information on any matters concerning the county. The powers of district councils in this respect are slightly more limited in that they may only incur expenditure on research and the collection of information in connection with the exercise of their statutory functions.'

'Most district councils will depend partly on the data assembled by properly trained staff ... and partly on that assembled by any county unit. There is clearly some danger of duplication of research effort, and to avoid this we suggest that each authority should maintain a central record of information and research findings to which reference could be made before new work is undertaken. Such a record would include not only data assembled by that authority's own departments, but also notes of, for example, research findings of other authorities and central agencies.'

This is an elaboration of Simon's injunction (*see bibliography*) that organisations should develop artificial 'memories' of information—record systems, files, and libraries.

**Relevance** Information may be collected for a specific task, and the sole criterion for collecting facts is their relevance to the problem.

**Financial data** Internal financial systems provide much management information though mainly for control purposes rather than for policy-making. Councillors place a heavy reliance on information sources that are internal; officers, agendas, and other councillors constitute their main sources of information in one recent survey (John Dearlove, *The politics of policy in local government*, Cambridge U P, 1973).

**External sources** There are particular external sources for specialist purposes. For example the Transport and Road Research Laboratory (TRRL) and the Building Research Establishment (BRE) generate and disseminate information which is invaluable to the professional officer in building and civil engineering.

**Published data** Apart from such institutions which specialise in particular fields, much information and many statistics of interest and use in local government are published by numerous sources. Some of these have been brought together in *Local government trends 1973* (The Chartered Institute of Public Finance and Accountancy, CIPFA, 1974).

## 5.6 Management information systems, MIS

**P** The advent of the computer has made it possible to store and retrieve, and to process large quantities of data through electronic data

processing (EDP), using the term in its traditional sense [*data sheet 8.08; 8.1 (ii)*]. As a result managers may be supplied with too much information of the wrong kind. Nevertheless with limited objectives and careful design, a system can be developed to suit particular needs, though it will not supply *all* the information that a manager requires. The Local Authorities Management Services and Computer Committee (Lamsac) in its report *A study of the computing requirements of local government in England* states:

'The information systems approach is the only means of answering the demands of corporate management for:

- Corporate** (i) Information related to the organisation as a whole rather than particular sections of it;
- Flexibility** (ii) flexibility in the gathering of information to allow for any relationships between information;
- Quality** (iii) integrated information which is consistent in quality, accuracy, and within one time-series;
- Efficiency** (iv) efficient use of effort and data by gathering information once;
- Need** (v) information which is needed as opposed to that which has been available;
- Evaluation** (vi) above all, adequate information to allow management to ensure that the objectives of the organisation are fulfilled.

The report points out that each county council and the district councils within it have common information requirements which should lead to a joint use of resources to achieve a common solution in providing a county-wide information system accessible to each of the parties involved. Lamsac is involved in a project with Leeds MDC and International Computers Ltd (ICL) to produce a Local Authority Management Information System (LAMIS) which should be in use in 1975.

## 15.7 Information technology

Rosemary Stewart (*The reality of management*, Pan Piper, 1967) defined information technology as a general term that includes operational research (OR), cybernetics (the study of control systems), and the use of computers both for processing information and to simulate higher-order thinking.

'All these can help the manager either by providing him with much more precise information about some of his problems or by giving him information faster. Information technology may radically change the nature of middle and top management jobs.'

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Data Sheet 8.15 Information. Commentary

The subject of this sheet is basic to management; information is needed (whether already in the mind or to be sought) for effective management, yet often enough one does not think consciously about it.

This sheet sets out to make people think about information and its value to management. The extract from Scott is fundamental and an excellent description of the process by which information is used in management (or in anything else).

The 'intuitive manager' will make a great display of managing without information; the hesitant man will never have enough information; in between these two extremes we need to develop the man who knows he needs more, and the kind he needs, and knows too that beyond this, more information will not significantly help him.



# MANAGEMENT

## FILE REFERENCE 8.16 (1) Communication

*Communication lies at the heart of the management process: information, ideas, commands and opinions need to be passed to and fro in organisations for effective functioning. Everyone should know of the problems inherent in the communication process. This sheet discusses formal and informal communications, the relationship between authority and communication, and problems of communication.*

### COMMUNICATION

#### 6.1 Communication and authority

The classic statement on communication in formal organisations was made by C I Barnard (see bibliography). Having defined the relationship between communication and authority [data sheet 8.05, 5.3(i)], and span of control (maximum 15 people, but in many cases six is the practicable limit), he sets out the controlling factors in the character of the communication system as a system of objective authority as follows:

- (i) The channels of communication should be definitely known. This refers to lines of authority which are established by, for example, designating posts, assigning duties, and organisation charts.
- (ii) Objective authority requires a definite formal channel of communication to every member of the organisation, ie everyone must know to whom he is subordinate and superordinate.
- (iii) The line of communication must be as direct or as short as possible. Most formal communication is written or spoken but language is susceptible to misunderstanding and much communication takes place without advance preparation. Even communications which are carefully prepared require interpretation. Also, the higher the position in the organisation from which the communication emanates, the more general will be its terms. Something may be lost or added in transmission at each stage of the communication process, especially with spoken communication; and the more stages there are, the slower will be the process. Accordingly the shorter the line, the greater the speed and accuracy of a communication.
- (iv) The complete line of communication should always be used, ie a communication from the top to the bottom of an organisation should pass through every stage in the line of authority. This should avoid conflicting communications being issued either upward or downward, and maintains responsibility in its proper place. This is similar to Henri Fayol's scalar chain [data sheet 8.03, 3.1(ii) (i)].
- (v) The competence of the persons serving as communication centres, ie officers and supervisory heads, must be adequate. The competence required becomes ever more general in relation to the work of the whole organisation, the more central the post and the larger the organisation.
- (vi) The line of communication should not be interrupted during the time when the organisation is to function. For example vacant posts should be temporarily filled to ensure the continuation of the communication system.
- (vii) Every communication should be authenticated, ie the person communicating must be known actually to occupy the position of authority concerned. People impute authority to communications from superior positions provided they are reasonably consistent with the authority those positions are deemed to exercise.

#### 16.2 Formal and informal communication

Total communication network

Barnard's statements equate the communication system with lines of authority but Herbert A Simon (see bibliography) points out that in a complex organisation the information and orders that flow downward through the formal channels of authority and the information that flows upward through these same channels are only a small part of the total network of communications. Simon seeks to understand the relationship between the formal and informal systems of communication in an organisation by examining the media of communication. Summarised, his views are:

##### (I) Formal communication

- (a) Only to a limited extent is any formal system of oral communication ordinarily established in the scheme of organisation. A system of formal authority presumes that oral communication will take place primarily between individuals and their immediate superiors or subordinates. Even when senior people maintain an 'open door' policy, accessibility is regulated by informal social controls, and a private secretary. The layout of offices is an important formal determinant of the communication system since physical propinquity may be a real factor in determining the frequency of oral communication.
  - (b) The flow of memoranda and letters is more often subjected to formal control, particularly in large organisations, than is oral communication. It is common, for example, that copies of communications are sent up the regular channels when a communication itself has cut across lines of authority.
- In some organisations work centres round the processing of a piece of paper. A file is moved from one point in the organisation to another for various types of action to be taken.
- A vital part of the formal communication system of almost every organisation is the system of records and reports.
- Manuals are used to communicate those organisation practices which are intended to have relatively permanent application. Without manuals the permanent policies will be known only to permanent organisation members and will soon cease to have any great influence upon practice. An important use of manuals is to inform new members and new recruits of established practices.

Oral

Written

Paper flow

Records

Manuals

Social relationships

##### (II) Informal communication

The informal communication system is built around the social relationships of the members of the organisation. Informal contact may create authority relationships if some people accept the leadership of others. In this way natural leaders secure a role in the organisation that is not reflected in, for example, the organisation chart. The formal communication system will always be supplemented by informal channels through which will flow information, advice and even

	orders. It is a major task of senior staff to maintain attitudes of friendliness and co-operation in informal personal relationships so that the informal communication system will contribute to the efficient operation of the organisation rather than hindering it. The informal system may, however, be used by members of the organisation to advance their personal aims.
Grapevine	The informal system sustains the grapevine which on the whole plays a constructive role, though it is often inaccurate [data sheet 8.02(2), 2.9(ii)]. It can be a useful barometer of opinion in the organisation.
Power and Influence	<b>(iii) Personal motivation</b> Individuals may develop the informal system in such a way as to increase their own power and influence within the organisation. They may also use both the formal and informal systems for their own ends. An individual may choose not to pass on information if the consequences of doing so might have an undesirable effect on himself [data sheet 8.11(2), 11.6(ii)]. Thus information tends to be communicated upwards only if: (a) its transmission will not have unpleasant consequences for the transmitter, or (b) the superior will hear of it anyway from other channels and it is therefore better to tell him first, or (c) it is information that the superior needs in his dealings with his own superiors and he will be displeased if he is caught without it. There is often a failure to communicate information upwards merely because the subordinate does not know what information a superior needs in order to make decisions. A major communication problem of the higher levels of the organisation is that much of the information relevant to decisions at this level originates at lower levels and may never reach the higher levels. Equally a superior may withhold information from a subordinate. While this may be accidental, in some circumstances it may be deliberate as a means by which the superior (usually an incompetent and insecure one) may maintain authority over the subordinate.
No repercussions Inevitable Displeasure	<b>(iv) Receptivity</b> The source of a communication, as well as the way in which it is presented, will determine for the recipient how much consideration he will give to it. Communications through formal channels (upward or downward) will normally be acted on, but unsolicited advice may be disregarded. Considerable frustration can arise from communications upward being disregarded because they do not come through the proper channels or are from someone who is not accorded a formal advisory position in the organisation.
Information withheld	Consideration needs to be given to the form of communication: whether it should be oral or written; in formal or informal language. In every case the state of mind of the recipient, and his attitudes and motivations, are basic factors in determining the method to be used.
Acceptance	
Form	

### 16.3 Communication problems

Koontz and O'Donnell (see bibliography) state that there is ample evidence that people start talking and writing without thinking. Preparing to communicate is a very serious matter: the objective must be clear, the premises known, the alternatives weighed, and the message selected.

Expression	The authors suggest that a review of the following problems will encourage an improvement in communication: (i) Vagueness and murkiness are common in communications whatever the methods used. The faults are poorly chosen and empty words and phrases, careless omission, lack of coherence, bad organisation of ideas, awkward sentence structure, inadequate vocabulary, repetition, jargon, and failure to clarify implications.
Translation	(ii) Managers occupy positions at the centre of communications in which they receive and transmit communications to and from superiors, peers and subordinates. In most cases the information is 'translated' into language suitable to the recipient. This process of interpretation calls for skill which if not present may affect efficiency continuously.
Transmission	(iii) Successive transmissions of the same message are decreasingly accurate. In oral transmission something approaching 30% of the information is lost in each transmission. Thus in large-scale organisations oral communication from one level to another is entirely inadequate.
Inattention	(iv) People fail to read bulletins, notices, minutes and reports, and to listen to oral communications.
Unclearified assumptions	(v) A critically important but often overlooked matter is the underlying assumptions behind a communication which remain unexpressed. The sender assumes that the recipient will 'know' what is expected though this has not been made clear.
Adjustment	(vi) Some communications announce changes which seriously affect hours of work etc and adequate time needs to be made available for the recipient to adjust to the changes.
Distrust	(vii) If a superior develops a reputation for issuing countermanding or modifying messages, subordinates will become conditioned to delaying action or acting unenthusiastically.
Evaluation	(viii) Premature evaluation of communications by recipients may stop the flow of information and engender a sense of futility in the sender. A communication should be heard or read in full before a response is made.
Fear	(ix) Although superiors depend on subordinates for information no foolproof classification of subject matter or of urgency has yet been developed to guide a subordinate in exactly what he should communicate upward. Thus the subordinate may select information poorly, communicate partial truths, or entirely omit necessary information from reports, partly through fear of the possible consequences.
Failure	(x) It is a fact that people fail to communicate needed information. The reasons are that people tend to be lazy, to assume that 'everybody knows', to procrastinate, to 'hog' information, or deliberately to embarrass.

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## A Municipal Engineering Data Sheet

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# MANAGEMENT

## FILE REFERENCE 8.16(2) Communication

Data sheet 8.16(1) introduces the subject of communication and discusses formal and informal communications, authority and problems of communication. This sheet discusses the influence of different patterns of communication, and their effect on behaviour.

### ● COMMUNICATION 16.4 Patterns of communication

**Small groups** H J Leavitt has carried out some experiments on communication patterns in small groups which are of general interest, extracts from which are given below. The work was carried out at the Massachusetts Institute of Technology (MIT) and reported in the *Journal of Abnormal and Social Psychology*, no 46, January 1951, and included in a book of readings edited by D S Pugh (see bibliography). One purpose of the investigation was to explore experimentally the relationship between the behaviour of small groups and the pattern of communication in which the groups operate.

**(i) Operational characteristics**  
'Consider the pattern depicted as A in fig 1. If at each dot or cell (lettered a, b etc) we place a person; if each link (line between dots) represents a two-way channel for written communications; and if we assign to the five participants a task requiring that every member get an answer to a problem which can be solved only by pooling segments of information originally held separately by each member, then it is possible *a priori* to consider the ways in which the problem can be solved.'

**(a) Pattern flexibility**  
'First we note that the subjects (Ss) need not always use all the channels potentially available to them in order to reach an adequate solution to the problem. Although pattern A, fig 1, contains potentially seven links or channels of communication, it can be solved as follows with three of the seven channels ignored.'  
**Step 1:** 'a and e each send their separate items of information to b and d respectively.'  
**Step 2:** 'b and d send their separate items of information along with those from a and b respectively, to c.'  
**Step 3:** 'c organises all the items of information, arrives at an answer, and sends the answer to b and then to d.'  
**Step 4:** 'b and d then send the answer to a and e respectively. The use of these particular four channels yields pattern C, fig 1.'  
'The original seven-link pattern (A) can be used as a four-link pattern in various ways. For instance each of the four Ss diagrammatically labelled c, b, a and e might send his item of information to d who would organise the items, arrive at the answer, and send it back to each respectively. Use of these particular four channels would yield pattern B, fig 1. The problem could also be solved by the Ss using five, six or all seven potential channels.'

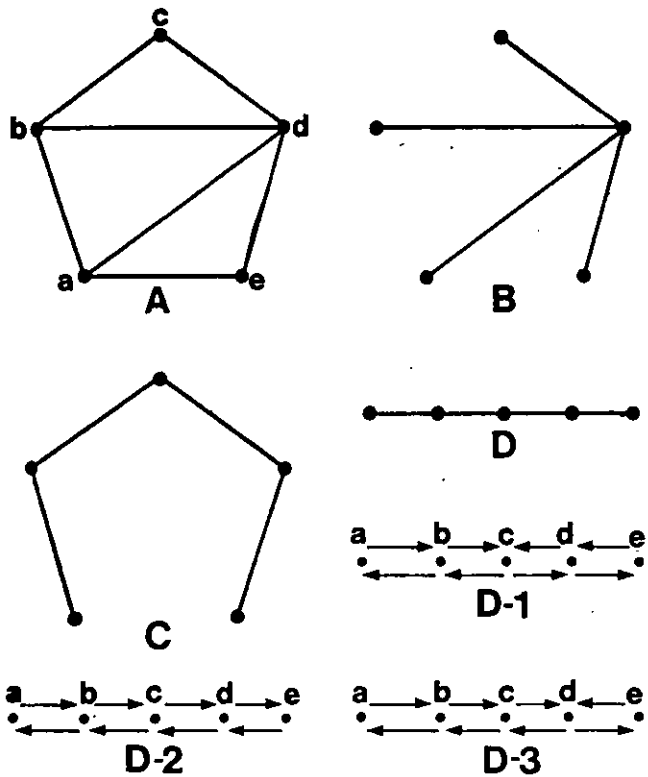


Figure 1: Communication patterns

**(b) Operational flexibility**  
'Secondly, with the specification that a given number of links be used, any pattern can be operated in a variety of ways. Thus the pattern D, fig 1, which has no pattern flexibility can be used as D-1, with information funnelled into C and the answer sent out from C. It is also possible to use it, as in D-2, with E as the key position; or as in D-3. These are operational differences that can be characterised in terms of roles taken by the various positions. Thus in D-1, C is the decision-making position. In D-2, it is E or A. Some patterns can be operated with two or three decision-makers.'  
Leavitt discusses some possible effects of various patterns on the performance of individuals.  
'There are two general kinds of reasons which dictate against our theoretically perfect performance from real people. The first of these is the obvious one that people are not standardised. There are also the forces set up by the patterns themselves to be considered. The problem becomes one of analysing the forces operating on an individual in any particular position in a communication pattern and then

Roles  
  
Imperfect performance

8.16(2) MANAGEMENT

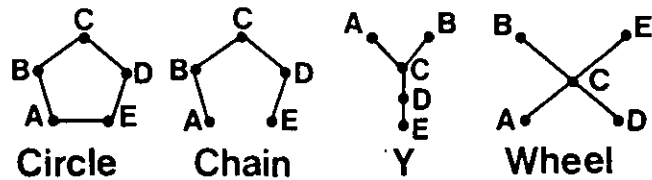


Figure 2: The experimental patterns

Centrality

predicting how the effects of these forces will be translated into behavior.'

'It is our belief that the primary source of differential forces will be *centrality*. Centrality will be the chief (though perhaps not the sole) determinant of behavioral differences because centrality reflects the extent to which one position is strategically located relative to other positions in the pattern.

'Our selection of centrality derives from the belief that availability of information necessary for the solution of the problem will be of prime importance in affecting one's behavior. Centrality is a measure of one's closeness to all other group members and, hence, is a measure of the availability of the information necessary for solving the problem.

'Availability of information should affect behavior, in turn, by determining one's role in the group. An individual who can rapidly collect information should see himself and be seen by others in a different way from an individual to whom vital information is not accessible.'

(ii) **Experimental patterns**

The four five-man patterns selected for this research are shown in fig 2.

After describing the procedure and results of the experiments Leavitt says 'Patternwise, the picture formed by the results is of differences almost always in the order *circle, chain, Y, wheel*.

'We may grossly characterise the kinds of differences that occur in this way: the circle, one extreme, is active, leaderless, unorganised, erratic, and yet is enjoyed by its members. The wheel, at the other extreme, is less active, has a distinct leader, is well and stably organised, is less erratic, and yet is unsatisfying to most of its members.'

Leavitt arrived at several conclusions about the effect of communication patterns on behaviour in small groups. 'The characteristic of the patterns which most clearly correlated with behavioural differences was centrality. He states '... it is felt that where centrality and, hence, independence are evenly distributed, there will be no leader, many errors, high activity, slow organisation, and high satisfaction. Whatever frustration occurs will occur as a result of the inadequacy of the group, not the inadequacy of the environment.

'Where one position is low in centrality relative to other members of the group, that position will be a follower position, dependent on the leader, accepting his dictates, falling into a role that allows little opportunity for prestige, activity, or self-expression.'

16.5 Behaviour

Organisation structure

Leavitt's research points to the importance of communication as a determinant of behaviour in organisations which has implications for both the communication process and the organisation structure [data sheet 8.11(2), 11.6(v)]. For example Rensis Likert (see bibliography), in describing the effects of one-to-one relationships in a typical formal organisation on communication, states that the head of the organisation holds meetings with the primary purpose of sharing information. However, if a head of department has some important factors bearing on action he wants the head of the organisation to approve, he does not reveal them in the general meetings. Instead he waits until he is alone with the head of the organisation when he can use the information to obtain the decision he seeks.

Motivation

Heads of departments are motivated against sharing important knowledge in general meetings and are inclined merely to disclose trivial information. By disclosing information only at one-to-one meetings a head of department can often increase his own power and influence, he may connive with peers or subordinates, or pit one peer or subordinate against another. Communication upward is sometimes highly filtered and correspondingly inaccurate. Likert says 'It is difficult and often hazardous for an individual subordinate in man-to-man discussion to tell the boss something which he needs to know but which runs counter to the boss's desires, convictions, or prejudices. A subordinate's future in an organisation often is influenced appreciably by how well he senses and communicates to his boss material which fits the latter's orientation' [data sheet 8.16(1), 16.2(iii)].

Departmental bias

A problem presented by a head of department in a one-to-one organisation is likely to be biased towards a departmental view, and to ignore or at least understate the organisation's point of view. Thus problems tend to be solved in terms of what is best for a department, not what is best for the organisation as a whole.

● Bibliography

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# MANAGEMENT

## FILE REFERENCE 8.16(3) Communication

The first two data sheets on communication deal with authority, problems, patterns, and the dominant aspect of centrality in the communication system. This data sheet deals with practical matters of communication and particular communication problems of the construction industry.

### ● COMMUNICATION

#### 16.6 Contraction of executive lines

In spite of the general need to use the complete line of communication [data sheet 8.16, 16.1 (iv)] circumstances do arise in day-to-day matters when it is necessary for a manager to communicate directly with people at lower levels rather than through his immediate subordinates. Unless this is done carefully it may have the effect of undermining the authority of the manager's immediate subordinates and of creating tension between them unnecessarily. Wilfred Brown discusses the point in detail in *Exploration in management* (Penguin Books, 1960) under the heading of 'Contraction of executive lines'. He defines 'contraction' as making executive contact with any member or members of one's extended command (ie all the employees under one's control and not only one's immediate subordinates), either directly or indirectly, through the intermediate subordinates. Brown says that contraction of executive lines is likely to arise where either there is an emergency, or where a manager decides to issue an instruction to a group or stratum of people in his extended command. Where contraction takes place the manager should ensure that the appropriate intermediate subordinates are kept informed with the least possible delay and that full responsibility is returned to them as soon as the cause of the contraction has been dealt with.

#### 16.7 Written or oral communication?

The advantages and disadvantages of written and oral communications are discussed by Koontz and O'Donnell (see bibliography), and summarised their views are:

(i) **Written:** These can be retained as records (sometimes legally required), and for reference; likely to be more carefully composed and therefore more accurate than oral communication; can sometimes save time and money [data sheet 8.16, 16.2 (i)].

Inadequate preparation often means that the message is not understood; such communications require to be supplemented by numerous written or oral clarifications so the cost is high; people keep many written records in large organisations as a means of defence or attack since it is a part of organisation life that others sometimes seek undeservedly to take credit or unreasonably to pass on blame [data sheet 8.11 (2), 11.6 (i)].

(ii) **Oral:** The chief advantage is its potential for speedy and complete interchange of views; questions can be asked and answered at once; the speaker is forced into face-to-face contact with the listener and challenged to make himself understood [data sheet 8.03, 3.1 (ii) (n)].

The listener does not always ask the right questions so that matters are not always properly clarified and this may result in costly error; it does not always save time [data sheet 8.16, 16.2 (i)].

Written or oral methods of communication are not mutually exclusive; it will often be necessary to use both methods in order to get a message conveyed accurately.

#### 16.8 Perception problems

Henry H Albers (see bibliography) discusses the problems of perception in his book and summarised his views are:

Perception involves integration, organisation, selection and interpretation of purely sensory phenomena. There are generally more elements in an environment than can be given attention at any one time and therefore people tend to select the elements that are essential to their needs and to 'recode' the diversity of elements into more abstract forms.

The learning process plays an important part in perception. People perceive particular learned patterns and not other possible patterns; indeed expectations derived from past perceptual experiences can cause people to insert 'phenomena' that are not present in the thing being perceived. Perception is also influenced by motives; people sometimes fail to see things that conflict with preconceived ideas, or things that might disturb them.

Thus differences in perception may affect communication [data sheet 8.12, 12.5]. Two persons always form slightly or significantly different perceptions of the same situation. Perception may also be viewed as a group phenomenon; persons in the same group [data sheet 8.13] tend to have similar perceptions about many matters.

Some of the factors that lead to different perceptions are sensory factors, age, sex, educational levels, income, regional differences, religious and other loyalties, organisational interests (eg subordinates sometimes have significantly different perceptions from those of their superiors of the same situation), and personality.

The act of translating perceptions into a message and deriving perceptions from that message is an important aspect of the communication process. Effective communication cannot occur if the same message conveys different perceptions to different people. The perceptions that result from a message can be partly attributed to the factors set out above, and to the language from which the message is formulated.

#### 16.9 Principles of communication

Koontz and O'Donnell (op cit) have formulated four principles which they describe as useful guides for establishing good communications because they direct attention to four critical areas: message quality, conditions for reception, maintenance of integrity of organised effort, and taking advantage of informal organisation. Summarised, the principles state:

(i) Communicate in commonly understood language. The person who originates a communication is responsible for expressing it understandably whether orally or in writing. This requires a literate approach and familiarity with the language patterns of subordinates, peers, and superiors.

(ii) Give full attention to receiving communications. No communication is completed unless the message is understood and

**Integrity** this requires attention and concentration.  
(iii) Make communications support organisational objectives. A communication is a means, not an end; it is one of the manager's tools for securing and maintaining co-operation in attaining organisational objectives. Subordinates should not be bypassed by communicating directly with lower levels in the organisation (but see paragraph 16.6 above).  
**Strategic use of informal organisation** (iv) Use informal organisation [data sheet 8.02(2), 2.9] constructively as a means of communication. Informal organisation exists outside the formal organisation and endures whether or not managers approve of it. It can have a destructive effect on the organisation. It should be mobilised to transmit and receive information supplementary to that provided by the formal organisation in the co-ordination of organisational effort.

16.10 The construction industry

**Drawings, bills, etc** Communications in the construction industry take several forms and include a brief, checklist, drawings, models, specifications, bills of quantities, estimates, and conditions of contract. A pilot study of problems of communication in the building industry was made by Higgin and Jessop (see bibliography) from which they identified five main problems associated with communications in the industry:

**Clients** (i) 'Communication with prospective clients. Are those who must take the key decisions about spending £3000m a year on building sufficiently aware of all the services the industry has to offer to be able to direct their spending most advantageously?

'Building is a service industry; it makes specific things to customer's order. But many prospective customers do not know enough of the range of technical and professional services available to them. . . .

**Clients and advisors** (ii) 'Communications between clients and advisors. To what extent does any member of the building team called upon to advise a client find out all about his needs and about all the possibilities that the industry can offer him? How often does a client (individual or corporate) find that had he known as much at the beginning of a project as he knows at the end, he would have made quite different initial decisions?'

**Design team** (iii) 'Communications within the design team. The effective achievement of the common design task requires full, rapid and continuous interchange of information. Why does this not occur? Sufficient thought and time does not seem to be given to ensuring, either as a design team brief or during the designing process, that all who must contribute understand the common objective similarly and fully. There is seldom a full awareness of all the steps necessary to realise an optimum overall outcome without loss of time, and the means of ensuring design co-ordination is often not clear. If the intercommunication problems of the design team were analysed in operational terms, more effective and rapid techniques could be devised for solving them.'

**Contracts** (iv) 'Communications related to contract. The information exchanged as a basis for entering into contractual obligations is widely experienced by all as inadequate. Why is this so? There is a very wide and very complex variety of ways in which the members of the building team can be contractually related to each other. But when a contract is entered into it is unusual for any of those concerned to know with any degree of certainty just what he can expect of others, and what others will expect of him.'

**Construction team** (v) 'Communications within the construction team. Control of construction requires: (a) effective communication within the construction team, and (b) effective communications between the construction team and others. How often are these conditions realised? The basic decisions of construction control are often incomplete or unduly rushed because necessary information is not available sufficiently ahead of time, or is not complete enough. On many occasions members of the construction team could, but do not, ease this problem by supplying the data that would facilitate the preparation of fuller and more useful information by others.

**Coding and data co-ordination** A later study of communications and related problems is *A study of coding and data co-ordination for the construction industry* (HMSO, 1969). It states: 'For long enough many people in the industry have felt that something should be done to improve communications and to facilitate access to data on, eg, materials, products and commodities, regulations, standards, costs etc. Additionally many have been uneasy about communications in the industry, particularly information made available to contractors, and the way in which data produced by one member of the building team may be independently produced again by others, either because they are unaware that the data already exists, or because they know it exists but cannot get access to it sufficiently readily or because the form is not right for their requirements.

This report makes the following recommendations for a framework that would serve to co-ordinate information systems. It would consist of:

**Vocabulary** '(i) A preferred vocabulary that would consist of the descriptors used in other parts of the framework.

**Classification** '(ii) Classification categories to allow information to be filed, retrieved and sorted in ways useful to the industry.

**Conventions** '(iii) Conventions for feedback and performance data, for procedures and for production information.

**Commodity file** '(iv) A central commodity file in which information about materials, products and components would be systematically made available, at first from standardised technical literature but later computer based.

**Procedures** '(v) Procedures developed preferably in related suites, for formalising many of the functions performed in the building process as a prelude to the wider use of computers.

**Codes** '(vi) Codes to make the transmission of information more reliable and more economical.' The study concentrated on building but the team considered that the broad conclusions and much of the detail are applicable to civil engineering.

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The writer recalls a few years ago that some people were saying that the main problem of management was communication. One seldom hears it said today. Nevertheless, poor communication remains a serious management problem, the more easily recognisable because there are daily occurrences of it in every organisation.

Much of this, as of other management problems, could be so easily avoided if only people would take the trouble to learn from the experience of others.

Barnard wrote good sense on the significance of communication as long ago as 1938, and although he may be well-known in industry, he is almost unknown in local government. The sheet begins with him because he fits in well with the formal organisation. Then comes Simon, who is equally unknown in local government, yet a writer on administration.

Koontz and O'Donnell tackle some of the daily problems of communication.

The second sheet becomes somewhat research-orientated but the writer wanted to deal with the problem of power, particularly via centrality, and Leavitt's work seemed most apposite.

The final part of sheet 2 elaborates on the motivational problems mentioned in sheet 1.

The third sheet becomes more practical and sets out some of the daily problems of communication. In some ways the order in which the writer has dealt with subjects may seem odd or possibly repetitive, but this is because he could not fit the subjects in the order he would have preferred into the first sheet, because of the limitation on the number of words in a sheet.

The perception problem is of the utmost importance and it affects us all in our daily lives. An understanding of it is basic to the solution of disputes.

At one time (only a few years ago) it was common to say that communication was the problem in industry, and that solving communication problems solved everything. In the writer's view its popularity was based on the perception problem, and communication used in that sense really meant that it was a 'PR' job of explaining to personnel just what the firm was about.

The writer has deliberately not dealt specifically with that aspect of communication as a separate item since he considers it to be included (so far as it is a communication problem as distinct from a PR one) in the three sheets.



# MANAGEMENT

## FILE REFERENCE 8.30 (1) Techniques

Numerous management techniques are available to assist municipal engineers to discharge their responsibilities effectively. This first data sheet in the sub-series dealing with techniques is on planning, programming and budgeting system (PPBS) which is a comprehensive management system embracing the use of many other techniques.

### ● PLANNING, PROGRAMMING and BUDGETING SYSTEM, PPBS

#### 30.1 Definition and development

Multi-year plan	PPBS has been defined as an articulated method of annually creating a multi-year plan for the action which an organisation expects to take in carrying out its responsibilities ( <i>Introduction to planning, programming and budgeting systems, MIS</i> , International City Management Association, vol 1, no L-9).
A management system	The Greater London Council defines it as 'a management system for an organisation as a whole, providing regular procedures for reviewing goals and objectives, for selecting and planning programmes over a period of years in terms of output related both to objectives and to resources necessary to achieve them, for allocating resources between programmes, and for controlling their implementation.' ( <i>PPBS: a general introduction to the Greater London Council's planning-programming-budgeting system 1970</i> ). See also <i>data sheet 8.10(2) 10.6(vi)</i> for another definition of PPBS. The terms 'output budgeting', 'performance budgeting' and 'programme budgeting' have been variously used by some writers to refer to PPBS, but not everyone is agreed that all these processes are the same. A W Peterson, then director-general of the Greater London Council, stated ( <i>see Bibliography</i> ) that 'PPBS, in simple terms, is a matter of
Decisions	(i) deciding what one is trying to achieve and what are the alternative methods, within available resources, of achieving it;
Action	(ii) organising, co-ordinating and controlling the action necessary to implement the chosen course;
Review	(iii) reviewing actual achievements against objectives, resetting those objectives, and adjusting the programmes of action to achieve them.'
Origin	The use of this technique in the public service is generally acknowledged to have begun when it was introduced into the United States Department of Defense in 1961. Since 1965, when the President requested each of the major federal agencies to introduce PPBS, there has been a rapidly growing interest in the use of the system in public administration both in the US and in the UK. The emphasis given in the Bains report to a corporate approach to management in local government will ensure that PPBS will be considered by many new local authorities as a basis for their management processes after 1 April 1974.
Corporate approach	

Consider alternatives	(c) It considers alternative ways of achieving those objectives.
Evaluate alternatives	(d) It evaluates those alternatives in terms of their use of resources and of their effects.
Make decisions	(e) Decisions are made in the light of that evaluation.
Take action	(f) Those decisions are translated into managerial action.
Monitor results	(g) The result of the action taken is monitored and fed back to modify the continuing process, by altering the perception of needs, the objectives set, the alternatives considered, the evaluation, the decision made or the action taken. This process is represented within the corporate management flow diagram in <i>data sheet 8-6. 8.06</i> .

#### 30.3 The need

Compartmental decision-making	The need for a management system such as PPBS arises because a local authority's activities are rarely considered as a whole. They are mainly considered in compartments made up of pairs of committees and departments, eg highways committee and surveyor's department, and education committee and education department. Consequently decisions tend to be made on the basis of departmental objectives which, though sound in themselves, may not be wholly consistent with the objectives of the local authority, and may result in some ineffective expenditure.
Objectives lacking	Hitherto a local authority is unlikely to have considered its objectives as a whole and set down what it hopes to achieve. A discussion on objectives by all senior officers, and by committees, is likely to reveal previously hidden conflicts and differing attitudes which may have impeded the achievement of results simply through ignorance of their existence.
Superfluous activities	In other cases activities carry on from year to year because no one has ever considered whether they are still necessary or desirable. Knowledge of such activities is often gained only when something goes wrong; the need for the activity is then considered and it may be modified or discontinued. All activities should come within the compass of an annual review to see whether the needs still exist, and if so whether the activities used to meet them are still appropriate.
Continuing policies	Once a local authority has made a decision, it is usually implemented, but rarely is the result examined to assess whether the assumptions made about the effect of the decision are correct. For example it may be decided to construct a housing estate on the principle of segregating pedestrians and vehicles. Only rarely are such schemes examined later in use to see whether the results are consistent with the assumptions made at the time of the decision, yet the underlying assumptions may continue to be used in decision-making by the local authority for many years. These inadequacies and conflicts should be resolved by the use of PPBS.

#### 30.2 The process

Define needs	The following model of the process has been devised by J D Stewart ( <i>see Bibliography</i> ): (a) The organisation identifies certain needs, present and foreseen, in its environment.
Set objectives	(b) It sets objectives in relation to those needs, ie the extent to which it will plan to meet those needs.

## 30.4 The activities

Identify needs	(i) Each local authority requires to keep itself informed, through environmental analysis, about the changing nature of the problems in its area and about new problems as they arise. Without this information action that is no longer relevant might be taken. For example, some local authorities in the past have continued to build three-bedroom houses when the real need was for much smaller accommodation. Thus an adequate system for collecting and storing information is required to highlight problems, and indicate trends well in advance of decision-making.
Set objectives	(ii) Objectives should be set at several levels to form a hierarchy of objectives. For example, R B Butt ( <i>see Bibliography</i> ) suggests that the overall objectives of a transport programme structure for a county council would be 'to facilitate the transport of goods and people to the maximum extent compatible with safety and preservation of the environment.' He suggests three second level objectives of which one is 'to promote rapid and economic transport', which itself has five sub-objectives including 'provision of highways' and 'traffic management measures'.
Consider alternatives	(iii) Open and constructive thought about ways of achieving an objective will usually produce a number of alternatives. None should be discarded without adequate examination even though some may appear difficult to achieve or be unconventional.
Evaluate alternatives	(iv) The consideration of alternatives should take place in the light of the total objectives of the local authority, so that inconsistent decisions are avoided. Criteria need to be sought against which to measure the effectiveness of schemes. Cost-benefit analysis may assist in choosing between alternatives, but it is a technique which must be used with great care since it highlights the problem of placing values on difficult items in the analysis rather than providing answers.
Make decisions	(v) All the information needed to make decisions is now available as a result of the previous activities and a list of work to be done is drawn up. This is arranged in the order in which it is to be carried out, bearing in mind the available resources (programming), and translated into financial terms for the immediate years ahead (budgeting), thus producing the corporate (or multi-year) plan.
Implement decisions	(vi) Action needs to be taken to assemble the necessary resources of money, staff, land etc to carry out the approved schemes that are included in the corporate plan in accordance with the agreed timetable. Schemes should be programmed using networks where necessary which will also assist in allocating resources through suitable analysis.
Monitor results	(vii) When schemes have been completed and are in operation they should be examined and reassessed to see whether they meet the criteria laid down for them, and also to find out whether the anticipated demand for the facility has itself changed or been incorrectly assessed. The basic cycle is thus completed and the resulting information fed back into the system to evaluate its effect on needs, and so the process is iterated.

## 30.5 Organisation

Structure	The change from looking at matters departmentally, to looking at them corporately, will require a change in organisation structure ( <i>data sheet 8.04(3)</i> ). Schemes will need to be prepared and examined by inter-departmental teams possibly in programme areas, and reports to
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committees on policy matters dealt with by the chief officers' management team (*data sheet 8.06*).

The duties of committees change under this system from dealing with detail in one particular sphere, eg highways, to considering important matters of policy over a wider field, eg town planning, building regulations and highways.

Programme areas

## 30.6 The corporate plan

Documents	The corporate (or multi-year) plan will record the results of the PPB process and will include a statement of the needs of the area, the objectives which have been set, the schemes and activities that are to be carried out to meet the objectives, with a programme for their completion, together with assessments of resources, and budget implications.
Plans	It will consist mainly of written documents but will probably include plans. For example the structure plan will form a basic part of the corporate plan and local plans may be incorporated within the programme of schemes and activities. Different parts of the corporate plan will have different time-scales and will vary from broad statements for the long-term parts (say 20 years) to much more detailed information for the early parts, including complete details for the year immediately ahead.
Time-scale	

## 30.7 Community approach

Counties and districts	A comprehensive management system which is confined to the work of one local authority alone, will suffer from the same defects that characterise a departmental approach within an authority. Under the provisions of the Local Government Act 1972, many functions will be concurrent as between counties and districts, and it will be necessary to integrate county proposals into district plans and vice versa.
Parishes	Similarly districts and their parishes will require to co-ordinate their respective programmes.
RWAs AHAs	Provision needs to be made to bring regional water authorities, area health authorities, and community health councils together with other relevant bodies, into the consultation process. Residents may well expect the district authority (metropolitan and non-metropolitan) to be the focus for community activities that are organised by local, county and regional authorities. Corporate plans should reflect this expected demand.

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# A Municipal Engineering Data Sheet

## Data Sheet 8.30 (1) Planning, Programming and Budgeting System, PPBS

### Commentary

This is the first of a sub-series on techniques and is numbered 8.30 because these sheets on techniques will then be filed towards the end of the set which may contain about 33 numbers in all. The purpose is to show that techniques follow the 'philosophy' of management in thought as well as in application.

PPBS itself seems likely to be developed by individual authorities in their own ways. The two major authorities which have done considerable work on this, GLC and Coventry (and to a lesser extent Liverpool and Gloucester CC) are very large and their experience may not be very relevant for the authority of 100,000, which is the new District Council average population.

Whatever detailed form the system takes in each authority, it probably matters little. The mere fact of trying to look at an authority's problems as a whole, and over a long period should produce more coherent results than hitherto. It should also encourage closer working between officers, and between officers and members.

It will be desirable to find out to what extent PPBS or some similar system (after all, it is not a fixed, defined system anyway) has been used post local government reorganisation, and to assess its usefulness.

# MANAGEMENT

## FILE REFERENCE 8.30(2) Techniques

*Management by objectives, MbO, is a technique which increases job satisfaction and improves performance, mainly by changing management style. It can be used as part of PPBS (data sheet 8.30(1)), or by itself.*

### ● MANAGEMENT by OBJECTIVES, MbO

#### 30.8 Definition and origin

**Participation** MbO is defined in the Treasury's *Glossary* (see *Bibliography*) as 'a technique under which targets are fixed as a basis for achieving greater effectiveness throughout the whole of an organisation or part of an organisation'. This approach to managing is based on the view that targets agreed by a manager\* and his subordinates are in themselves an incentive and that they form a yardstick against which performance can be measured. Managers and subordinates are likely to be more effective if they themselves have been involved in setting the objectives to which they are working.

**Better results** The concept of management by objectives stemmed from writers on management in the 50s, particularly Peter Drucker, notably in *The practice of management*, and was developed as a systematic approach by Urwick, Orr and Partners Ltd, especially by John Humble, under the heading of 'improving business results'.

\* For a definition of management, see data sheet 8.01

#### 30.9 The MbO cycle

Glendinning and Bullock (see *Bibliography*) describe the MbO cycle, see Fig 1, as follows:

<b>Strategic plan</b>	'(a) Top management formulates a <i>strategic plan</i> by defining the corporate aims and objectives in the short, medium and long term in the key areas of its business.
<b>Tactical plan</b>	'(b) Course of action and the resources required to meet these objectives are incorporated in a <i>tactical plan</i> .
<b>Unit objectives</b>	'(c) <i>Unit objectives</i> and the roles of individual managers are clarified and the desired outputs agreed.
<b>Improvement</b>	'(d) <i>Improvement possibilities</i> are identified and incorporated in individual and corporate improvement plans.
<b>Review</b>	'(e) After allowing time for action, systematic <i>reviews</i> are carried out to assess the performance results.
<b>Update</b>	'Objectives and output requirements are <i>updated</i> .
<b>Flexibility</b>	'Additionally MbO requires '(i) An organisation structure providing maximum freedom and flexibility in which to operate. '(ii) Management control information in a form and frequency which enables quick decisions and progress checks to be made.'
<b>Information</b>	
<b>Training</b>	It is also necessary to organise for management development, ie to arrange for training managers to improve their effectiveness and to accept some responsibility for self-development.
<b>Motivation</b>	Each manager's own motivation needs to be strengthened, in addition to that provided by MbO itself, by effective selection and succession plans, and by proper remuneration.

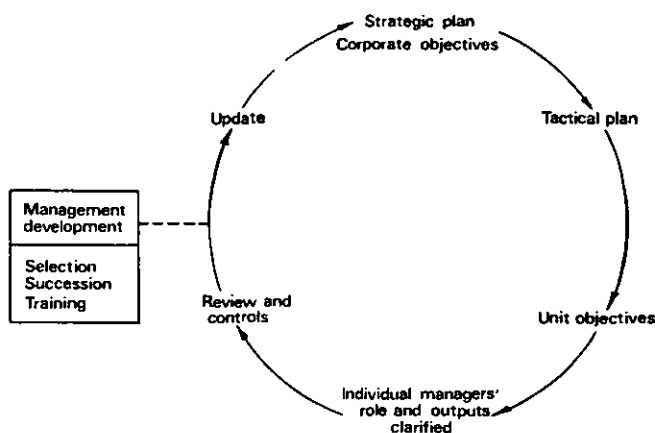


Figure 1: The MbO Cycle

#### 30.10 MbO and the departmental manager

**Objectives and standards** The *raison d'être* of MbO is to involve heads of departments (units) in the setting of objectives for themselves and for their departments, and to establish performance standards. Ideally these unit objectives and standards are set by agreement between superior and subordinate, and within the context of a job description for each post.

**KRAs** Within the context of the departmental objectives, key result areas (KRAs) are defined. These are the parts of the work of the department which have a significant effect on the achievement of the objectives of the organisation as a whole. Performance standards are then defined within each KRA, and they fall within two main categories according to Humble (see *Bibliography*):

**Quantitative** (a) 'measured or quantitative, ie those standards which can be expressed in terms such as: goods produced per month, cost levels, per cent delay time;

**Qualitative** (b) 'judged or qualitative, ie those standards which although not directly measurable in quantitative terms can be verified by judgment and observation.'

Quantitative standards are preferable and can often be developed for work which appears at first sight suitable only for qualitative standards. To assess his own and his department's performance against the agreed standards, the departmental head requires regular and adequate control information of the right type. He will search continuously for improved performance through quicker but no less satisfactory methods of reaching the agreed standards.

A formal performance review takes place at least once each year at which objectives and performance standards are reviewed and updated in the light of experience. Reviews of methods and results in key areas can take place at more frequent intervals.

**Promotion** During this process, management development is borne in mind so that people's training needs can be identified and arrangements made to strengthen their knowledge in particular fields, and to prepare them for promotion in appropriate cases.

## 8.30(2) MANAGEMENT

### 30.11 Implementation

(i) **Climate:** MbO is a systematic approach to what some managers are already doing piecemeal. Being a participative style of management, it will not flourish in a strongly autocratic environment.

**Commitment** Commitment by staff is vital according to Glendinning and Bullock (*op cit*) and . . . 'it will only come from a recognition that MbO . . . is an effective approach to marrying the needs of the individual to the needs of the organisation. Demonstration of practical results has consistently been shown to be a most effective way of securing commitment. However, the most powerful motivator is working towards achieving worthwhile and demanding short-term objectives under the leadership of a fully committed top management.'

**Management style** The starting point for implementing MbO will depend on the management system currently in operation, eg if PPBS is in use (*data sheet 8.30(1)*) much of the preliminary work of setting objectives may have been done. If the management style is already participative, less preliminary training will be needed. Once there is general commitment within a department or across departments to the concept of a participative, results-orientated, management style, work can begin on clarifying job descriptions, identifying KRAs, for both the department and individuals, and defining interrelationships between posts not only internally to the department, but externally to other departments where appropriate.

**Three tasks** (ii) **Management adviser:** A full-time management adviser is needed to introduce MbO to an organisation. He may be a consultant, or a member of the staff who has the necessary status, knowledge and skill. In most authorities his first main task is to change the attitude of staff to an acceptance of a participative style of management. His second main task is to assist staff clearly to define their jobs, their interrelationships with other posts, to establish KRAs, and to establish performance standards. His third main task is to assist staff to establish objectives.

### 30.12 Application

The application of MbO in different organisations will differ in detail. To illustrate the system described above, the following examples are given from the system in the town clerk's department of Manchester City Council as described by Glendinning and Bullock (see *Bibliography*).

Town clerk's department, Manchester

(i) **Overall purpose:** To co-ordinate, motivate and supplement the activities of the various departments in order to ensure that all council decisions are made in the light of the best available information and advice, and that these decisions are effectively implemented and controlled.

Staffing

Organisation

Motivation and co-ordination

Common services

External relations

Commercial and industrial development

Administration Law Management

Contracts

No rejection  
No delay

#### (ii) Key result areas (KRAs)

(a) To ensure that each department of the corporation has a staff assignment of such a kind and size as will enable it to achieve its objectives; and that all posts are filled with qualified and trained employees.

(b) (i) To ensure that the corporation's departmental structure provides the most effective and economic framework for achieving objectives.

(ii) To provide the most effective and economic structure within the town clerk's department which is compatible with the achievement of objectives and workload.

(c) To stimulate, motivate and co-ordinate departmental activities towards providing advice for the setting of city council objectives and towards the achievement of those objectives.

(d) To provide common services to the corporation, its committees and departments.

(e) To ensure that the decisions and activities of the city council and the attributes of the city are effectively represented and promoted.

(f) To encourage the level of commercial and industrial development of the city which will enable the corporation's financial objectives to be achieved.

(iii) **Common services:** KRA, (d) above, is to provide common services, and this is divided into three main activities: administration of committees, provision of legal services, and provision of management services. Each of these main activities is further subdivided, and legal services for example comprises: legal rights and obligations, prosecuting service, advice and guidance, civil claims, and conveyancing and contracts.

This last item, conveyancing and contracts, is the responsibility of the chief conveyancing assistant. The main purpose of his job is 'By completion of legal documents and advice, to ensure that council decisions are capable of being fully implemented and enforced and that resultant corporation activities are not delayed or prejudiced; and to maintain staff performance to achieve this'.

He has several key tasks of which one is 'To ensure programme achievement in respect of all work allocated to the group to professionally acceptable standards of quality'.

Several standards of performance are set for the achievement of this key task and among them are:

(a) All documents submitted to HM Land Registry are accepted.

(b) No activity/scheme of the corporation is impeded or delayed because documents are incomplete/inaccurate/inadequate.

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#### DATA SHEET 8.30(1)

In the last line of 30.2(g), *data sheet 10.6* should read *data sheet 8.06*.

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## A Municipal Engineering Data Sheet

Data Sheet 8.30 (2) Management by Objectives, MbO. Commentary

Management by Objectives seems to be a technique which is ideally suited to be introduced into local government when so much is being said about a corporate outlook. From the examples given in Glendinning and Bullock it seems as though the paperwork could easily get out of hand.

However, there are two main advantages that seem likely to come out of using MbO even if the system as such is not wholly effective. These advantages are: 1) that people have to think about measures of output or performance and it dawns on those who do not already know, that they are expected to produce something; 2) that staff are introduced to concepts of management (particularly senior staff) which they might not otherwise hear of. Their awareness is changed and hopefully their attitude too will change, and a more participative style of management result.

The 'system' side of MbO, or any other technique is likely to overwhelm the 'objective' side of it, and thus discredit it. Care needs to be taken to keep the technique in perspective, as being simply a systematic way of doing our day-to-day work, and once introduced should merely 'carry on' of its own inertia.

# MANAGEMENT

## FILE REFERENCE 8.30(3) Techniques

*It is part of day-to-day management activity to choose between alternative schemes. To be able to select from alternatives rationally, it is necessary to have sufficient information to compare the alternatives on the same basis. Cost-benefit analysis, CBA, is a technique designed to assist decision-making by comparing all the costs and benefits of different schemes.*

### ● COST BENEFIT ANALYSIS, CBA

#### 30.13 Definition

Long history	S S Morris, city engineer, Cape Town, states in 'Problems of progress', <i>IME Journal</i> vol 80: 'The underlying idea of cost-benefit analysis is really not new; indeed basically it is merely putting into scientific form what is normally done, albeit very crudely, as a matter of ordinary common sense. It may well find more extended application in civil and municipal engineering.' Leo Case in 'Cost benefit analysis of road works', <i>IME Journal</i> vol 94, records that 'Even as a formal conscious process, cost benefit has a relatively long history. The Frenchman Dupuit wrote on the utility of public works in 1844, and the Army Corps of Engineers in the USA have applied cost benefit to river and harbour projects since the turn of the century. . . . It has been used in Britain for major projects such as the London-Birmingham motorway (1960), the Victoria line (1965) and the third London airport (1970).
Definition	Cost-benefit analysis is defined as 'A systematic comparison between the cost of carrying out a service or activity and the value of that service or activity, quantified as far as possible, all costs and benefits (direct and indirect, financial and social) being taken into account' ( <i>Glossary of management techniques</i> , HMSO, 1967). The glossary states that 'CBA involves the listing and consideration of as many effects as can be identified — beneficial and adverse, short term and long term, tangible and intangible — on all persons and groups likely to be affected (however remotely) by a proposed project or service. The value of this appraisal depends on how completely all effects can be traced and the extent to which they can be evaluated in comparable (normally monetary) terms.'

#### 30.14 Identifying and evaluating effects

Identification	The difference between a straightforward financial appraisal of a project and a cost benefit analysis is that the former treats the project as complete in itself whereas CBA demands that external effects be included. For example Alan Williams ( <i>see bibliography</i> ) points out that in considering the Victoria line, Foster and Beesley estimated that a large part of the benefits would accrue to people who continued to travel by means other than the Victoria line itself, and hence who would not contribute at all to its fare revenues. It is equally necessary to avoid counting the same benefits or costs twice which may appear in different guise.
Evaluation	Having identified all the effects of the kinds set out in the definition quoted above, the next step is to value them; this is a major problem and one which has caused a great deal of discussion. For convenience, monetary values are placed on

	each cost or benefit although this does not cause CBA to become a financial technique. Richard Layard ( <i>see bibliography</i> ) states that broadly the valuations fall under four main heads: 'The relative valuation of different costs and benefits at the time when they occur. 'The relative valuation of costs and benefits occurring at different points in time: the problem of time preference and the opportunity cost of capital. 'The valuation of risky outcomes. 'The valuation of costs and benefits accruing to people with different incomes.' Layard deals with each of these at some length and the following is a brief outline of his views. (i) Measuring costs and benefits when they occur. Two main problems arise in valuing these net benefits: (a) 'For market items, market prices may be either distorted (eg by taxes or monopoly) or reflect a market disequilibrium (eg unemployment or balance of payments troubles). (b) 'For non-market items (including public goods and the external effects of market items) we need to devise methods of valuation (eg for time, recreational amenities, life and so on).' Both problems are dealt with by using shadow prices. These are implicit values as distinct from market prices which are explicit values of goods being bought or exchanged. (ii) Measuring costs and benefits which occur at different points in time. This problem is considered under two main headings: (a) The social time preference rate. This is the value of next year's consumption relative to this year's, and is equivalent to a discount rate. If $r$ is the rate by which present consumption is preferred to future consumption, then £1 of this year's consumption is worth £(1 + $r$ ) of next year's. The problem of fixing the discount rate is acute and three main approaches have been suggested: (i) 'Use post-tax interest rates on long-term risk-free bonds.' (ii) 'Make assumptions about the desired growth rate and the inter-temporal indifference map. (iii) 'Make assumptions about the desired growth rate and the production possibility curve.' (b) The social opportunity cost of capital. If there is too little growth in the economy, capital investment, and hence investment displaced by a current project, is socially more valuable than consumption of equivalent monetary value. Thus the discount rate to be used should be one which represents the social value of consumption at different periods, ie the rate of social time preference. (iii) Risk. 'The cost of risk is the difference between the mean or "expected value" of the
Shadow pricing	
Discounting	
Risk	

## 8.30(3) MANAGEMENT

prospect and the value which the individual actually places on the uncertain prospect, ie the certain prospect which he rates as of equal value.' However, the public sector is very large and contains many taxpayers. As the number of taxpayers over which a project is spread increases, so the total cost of risk diminishes. For practical purposes it can be assumed that there is no risk cost accruing to taxpayers in most investment projects.

**(iv) Distribution of income.** Schemes will confer benefits on some people but not on others (see Victoria line, 30.14 above). If the present value of a project to the gainers exceeds its cost to the losers, the gainers will be better off than before, and redistribution of income will have taken place. It may be necessary to decide whether or not a scheme increases social welfare and if so to weight the changes of income of each of the parties affected by the marginal social values attaching to the income of each group.

The need to identify and value *all* benefits and costs is emphasised by Ruth Mack (see *bibliography*), who states that non-economic elements should be valued by the decision-makers themselves. If the economic group of elements in alternative schemes is small relative to the others, placing number values on the latter may do more harm than good by giving a spurious sense of precision to the analysis.

Income

Variety

CBA has been used to assess projects of many kinds, eg on the M1 motorway, the Victoria line, the Fleet line, the Tay bridge, recreation, airports, slum clearance and redevelopment, car-parking, and highway improvement schemes. CBA was used in evaluating sites for the third London airport (see *bibliography*), and this is of interest because of its great detail, the fact that the proposed methodology was published in advance and modified in the light of comments made, and because the recommended site (Cublington) was rejected by the Government which chose Foulness for, it was said, environmental reasons. Much evidence submitted to the commission argued that a cash value should not be put on non-material things for which there is no market valuation, and that in any event it was not possible to make a cash valuation for the priceless parts of Britain's historical or national heritage. In this respect the CBA was based on observations and deductions of the very high values many people assign to cultural or natural phenomena. It was assumed that it was preferable to try to extend the valuation as far as was possible and convincing, and obtain factual data which could provide the basis for an explicit and sensible final judgment.

## 30.16 Limitations

Complexity

CBA has become a very complex problem-solving device in so far as the identification and valuation of costs and benefits is concerned. The complexity and fineness of the calculations tends to invest the analysis with a precision which it really lacks.

J A Kenyon in 'The engineer in society', *IME Journal* vol 99, states: 'Cost-benefit analysis in matters where abstract or emotional factors have to be given points rating or assessment of equivalent monetary values can easily go awry as the result of inappropriate initial assumptions. It may sometimes be better to confine analysis to factors of known monetary value, and after listing the indeterminate factors to leave decisions to experienced judgment of the engineer and his clients.'

Simplicity

Notwithstanding that it is claimed that *all* costs and benefits should be included for CBA to be effective, the Department of the Environment has developed the COBA method of appraisal (see *bibliography*) for inter-urban road schemes which explicitly excludes some costs and benefits. The DoE states that the basis of the calculations is not highly technical and that it appeals to straightforward common sense.

The COBA method (*data sheet ROADS 1.08*) takes into account direct traffic benefits and cash outlays but not the more intangible and unquantifiable characteristics of a road scheme such as its effect on the environment or stimulus to local economic development.

Nevertheless it is emphasised that although such factors are not included in the calculations, great importance is attached to them. 'The view is that it is best to calculate what can be readily quantified — that is the costs and traffic benefits — to guide substantially, but not dominate, the final decision made taking all relevant factors into account.'

Not infallible

'There is at present no method of appraisal of road schemes from which an absolutely right and infallible answer can be read off. Probably there never will be, though work will continue with the objective of further refining and improving the techniques of appraisal. For COBA we would make no more than the modest claim that it will be a better tool than was previously available to help in the decision-making process.'

## 30.15 Applications

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Data Sheet 8.30 (3) Cost Benefit Analysis, CBA.    Commentary

Cost Benefit Analysis ought to be a useful technique for choosing between alternative schemes, but the economists seem to have converted it from a broad way of weighing alternatives, to a very detailed and complex technique. Nor is there even agreement among economists about how to assess values.

The Department of the Environment grasps this nettle and sets out in COBRA to keep CBA simple yet effective, and says that the system has its limitations and should be used only as a guide in conjunction with subjective judgements of those items not specifically valued.

# MANAGEMENT

## FILE REFERENCE 8.30(4) Techniques

The need to organise large-scale, complex jobs in the most economical manner has led to the development of techniques to assist in the planning and controlling of operations (including design), and the allocation of resources needed for their completion. Such techniques come within the general title of networks and include Network analysis, Critical path method (CPM), Programme evaluation and review techniques (PERT), and Resource allocation and multi-project scheduling (RAMPS). Like all techniques, this is a tool of management, and should always be considered as such and not allowed to become an end in itself.

### ● NETWORKS Part 1

#### 30.17 Definition and development

Definition	Network analysis, CPM and PERT are defined in <i>Glossary of management techniques</i> (HMSO 1967) as 'Methods of planning the undertaking of a complex project in a logical way by analysing the project into its component parts and recording them on a network model or diagram which is then used for planning and controlling the interrelated activities in carrying the project to completion'. The prime term 'project network techniques' (PNT) has been adopted ( <i>see Bibliography BS 4335: 1972</i> ) in preference to project network analysis in the interests of rationalising terminology on a world-wide basis.
PERT	Programme evaluation and review technique was developed by the Special Project Office of the United States Navy and first used in 1958 for the planning and control of the Polaris weapon system. It uses three estimates of time (optimistic, normal and pessimistic) instead of one as in the critical path method, and for this reason may be of more use in variable situations where single estimates of time are not very meaningful, as, for example, in research and development.
RAMPS	Resource allocation and multi-project scheduling is an extension of PERT and is defined in the <i>Glossary of management techniques</i> as 'a system of allocation using a network diagram to assist management to make the best use of resources which have to be spread over a number of projects, and also to estimate the optimum level of such resources'.
Bar charts	Probably the most widely used planning technique is the Gantt chart (bar diagram) which is a familiar feature of drawing offices and construction site offices ( <i>see Fig 1</i> ). It is named

after H L Gantt, who devised it.

Figure 1 shows part of a Gantt chart for the construction of a small building. The chart shows the programme for the start and finish of each activity (upper bar), and the actual progress made in each activity is plotted (lower bar) on to the chart at predetermined intervals (often weekly). The basic bar chart is used for planning, and checking progress on jobs and is adapted by firms and individuals to suit their particular requirements.

A modification of the Gantt chart is the introduction of 'mile posts' or 'milestones'. These are significant points on the chart and may represent, for example, the points at which succeeding activities could begin. In a simple construction project such as that represented in Fig 1 activities will be sequential but in complex jobs it may not be so obvious at what point in the project a later activity should begin. Thus milestones marked on the chart assist in planning. The next step is to link together milestones which are interrelated in time, and thus an embryo network is produced.

The main potential advantages of networks are:

- (a) in drawing the network the planning of the sequence of operations is separated from the task of estimating their duration, which removes one of the difficulties involved in compiling bar charts;
- (b) the completed network illustrates the whole plan for the project and the interrelationships of the various parts. Thus those concerned in implementing parts of the project are able to see both how those parts fit in with the whole plan, and assess the soundness of the plan;
- (c) it facilitates more accurate planning of a project, its interrelated parts, and regular up-dating, which should result in shorter times for completion;
- (d) it facilitates the calculation of resources needed, and their most effective deployment;
- (e) it enables progress to be more readily checked against programme;
- (f) changes in the overall plan, or parts of it, required in response to unforeseen difficulties, are made easier, and the effect on interrelated activities more readily appreciated.

#### Advantages

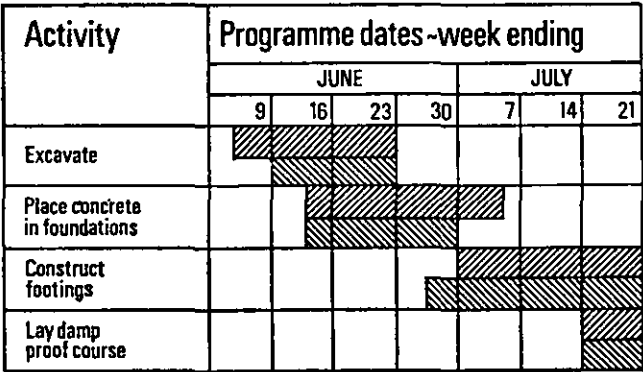


Figure 1: Gantt chart for part of a small building

8.30(4) MANAGEMENT

30.18 The arrow diagram

Logical sequence	The arrow diagram is prepared from a list of all the individual activities in a project, set out in the logical sequence in which they will be done and showing interrelationships between them.
Activities	There are two styles of diagram—the activity-on-arrow network, in which the arrows symbolise the activities, and the activity-on-node network, in which the nodes symbolise the activities. These nodes are drawn as rectangles and they contain essential information about the activities, eg start and finish times, and float. Although the two styles of diagram have a quite different appearance, their purpose and construction is similar. In the activity-on-arrow diagram each activity is depicted in the diagram by an arrow, the tail of the arrow representing the start of the activity and the head its completion (an event). Each event is depicted by a circle which is numbered and which represents the completion of all preceding activities.
Events	

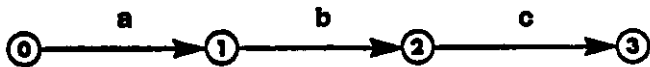


Figure 2: Activities and events

A succeeding activity cannot begin until the preceding one terminates. In Fig 2 the arrows a, b and c represent activities, and the completed activities (the heads of the arrows) show events 1, 2 and 3, depicted by circles. Activity b cannot begin until activity a is complete, ie at event 1. Activities are usually identified by event numbers, ie a is 0-1, b is 1-2, and c is 2-3. Numbering should preferably be arranged so that the number at the head of the arrow is larger than that at the tail, since it is more logical and assists checking. The arrows are not usually drawn to scale and therefore their lengths have no significance, neither have their inclination and position.

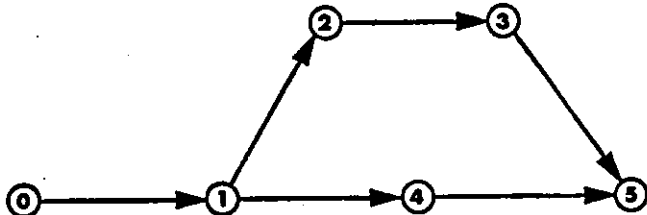


Figure 3: Numbering

The six activities shown in Fig 3 are 0-1, 1-2, 2-3, 3-5, 1-4 and 4-5. Neither activity 1-2 nor 1-4 may begin until activity 0-1 is completed and event 1 occurs. Event 5 will not take place until both activities 3-5 and 4-5 have been completed. The use of event numbers for identifying activities, ie 0-1, 1-2 and 2-3 instead of the supplementary system a, b and c as in Fig 2, enables a network to be compiled direct

from a list of activities which have been numbered and the sequence determined. The sequence is determined by asking three questions of each activity:

- Key questions
- Which activities must precede it?
  - Which activities may take place at the same time?
  - Which activities will succeed it?

For example, a job which involves the following activities can be drawn as a network without any further information being given: 0-1, 1-2, 1-4, 2-3, 4-3, 4-5, 4-7, 3-8, 5-6, 6-8, 7-8, 8-9. Thus both activities 1-2 and 1-4 may begin on completion of event 1 but not before. There are three events which cannot begin until event 4 has occurred, ie 4-3, 4-5 and 4-7. There is one activity (3-8) which cannot begin until two activities are completed in event 3. There is one activity (8-9) which cannot begin until three activities are complete and event 8 occurs. All these points may be noted merely from inspection of the list of activity numbers. The activity-on-arrow network illustrating the activities and events in the list is given in Fig 4.

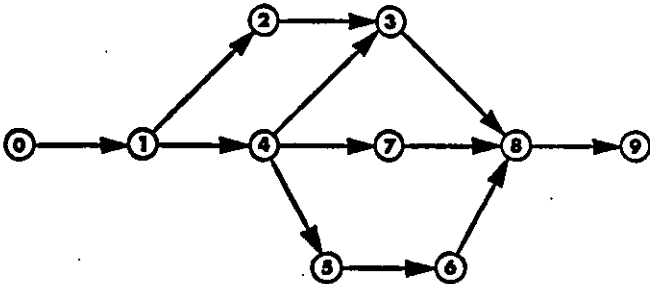


Figure 4: Diagram prepared from list

In practice the drawing of a network for a complex job is the result of trial and error and several attempts may be required before a satisfactory network is produced.

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# MANAGEMENT

## FILE REFERENCE 8.30(5) Techniques

Part 1 (data sheet 8.30(4)) deals with the development and advantages of networks, and introduces the activity-on-arrow network. This sheet deals with the completion of that type of arrow diagram. The early stages of a project are likely to offer the best opportunities for time savings, and therefore the preparation of the network should begin as far in advance of the planned date for the start of the work as possible.

### ● NETWORKS Part 2

#### 30.19 Dummy activities

**Complete logic** It may be necessary for complete logic, or convenience, to insert in a diagram a dummy activity, being an activity which consumes neither time nor any other resource. A dummy activity is shown by a dotted arrow but is otherwise the same as any other activity for the purposes of the network. Sometimes two or more activities may be undertaken in parallel: see 9-10, fig 5.

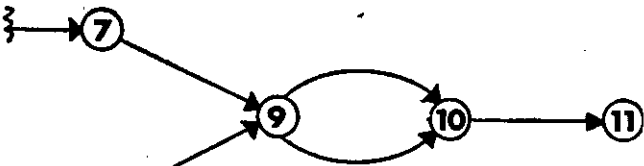


Figure 5: Parallel activities

To avoid confusion, a dummy activity is introduced, 9-10, fig 6, and succeeding events renumbered or a subsidiary number, eg 9a, used.

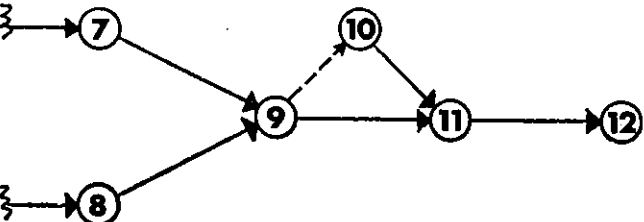


Figure 6: Dummy activity A

Each of the two parallel activities depicted in fig 5 as 9-10 have a unique number in fig 6 after the introduction of the dummy, namely 9-11 and 10-11. There are other circumstances where the logical relationships between activities result in the need for a dummy activity to be introduced. For example, the start of an activity may be dependent on two events, not one. Consider four activities — 1-2, 3-4, 4-5 and 2-6 — where the start of 4-5 is dependent on both 1-2 and 3-4 being completed. The logic of the network will be maintained if a dummy activity 2-4 is used (see fig 7).

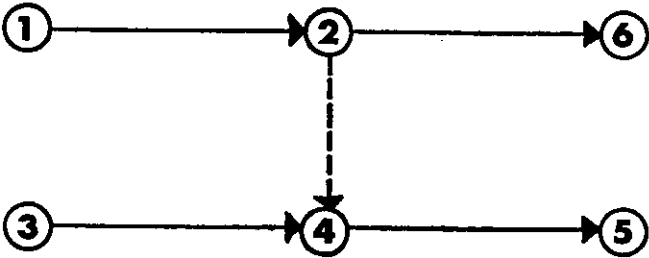


Figure 7: Dummy activity B

**Overlapping** It is common in the construction industry for some sequences of operations on large jobs to overlap, eg excavation, laying foundations etc [see fig 1, data sheet 8.30(4)]. It is clear that the sequential arrow diagram, fig 8, does not wholly represent this programme, since activity 1-2 (place concrete) need not wait for 0-1 (excavation) to be completed, and 2-3 (construct footings) can begin before 1-2 has ended. Therefore activity 1-2 overlaps activity 0-1, and 2-3 overlaps 1-2. This is dealt with by dividing activities into suitable sections and by the introduction of dummy activities as shown in fig 9.



Figure 8: Overlap not shown

ended. Therefore activity 1-2 overlaps activity 0-1, and 2-3 overlaps 1-2. This is dealt with by dividing activities into suitable sections and by the introduction of dummy activities as shown in fig 9.

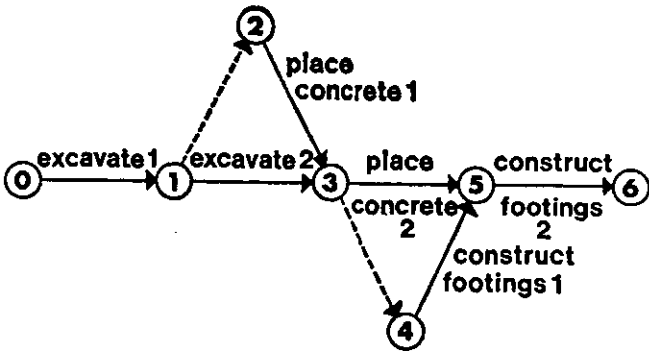


Figure 9: Overlapping

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Excavation is divided into two lengths, and when the first (0-1) is complete, placing concrete (2-3) can begin and be taking place at the same time as the remaining excavation (1-3) is being done. Similarly the construction of the first part of the footings (4-5) can begin when the first length of concrete has been completed (2-3) and be under construction at the same time as the second section of concrete is being placed (3-5). The time for curing concrete can be included in the activity, or separated as one which consumes time but no other resources. Overlapping activities may also be represented as shown in fig 10.

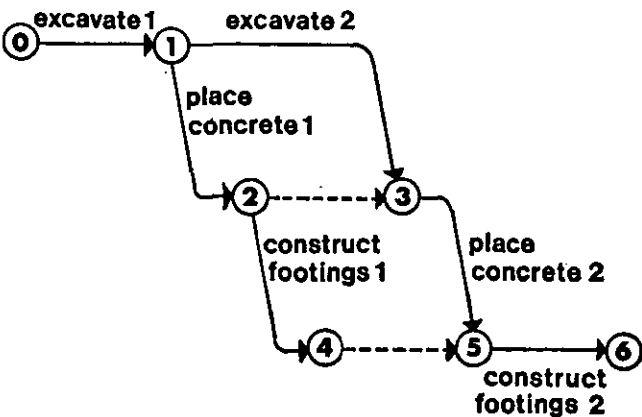


Figure 10: Overlapping — alternative diagram

30.20 Drawing the network

Identifying responsibility

List activities

Establish sequence

Draft diagram

Number events

Check logic

Participation

Size and complexity

Where responsibility for activities is shared between different organisations, or between different parts of the same organisation, and it is necessary to show these in the network, the areas of responsibility to be depicted will have to be defined. They can be conveniently shown in horizontal bands. Then all the activities to be undertaken (subdivided into the detail required) are listed within each area of responsibility and allocated a number and code letter designating the area of responsibility. Each activity is then examined to determine those activities which immediately precede it, and these are listed. At the same time activities which may be done concurrently are noted. The remaining activities will follow it. The first list of activities in logical sequence (and indicating inter-relationships) can now be prepared and from it the first draft of the arrow diagram drawn. The arrows should be drawn from left to right and dummy activities introduced to preserve the logic of the diagram. Events should be numbered sequentially starting with the first activity but leaving gaps to enable additions and amendments to be made without the need to alter the whole of the numbering. When completed the diagram should be checked to ensure that its logic is complete. The list of activities, the order in which they will be carried out, and the drawing of the network, should involve at appropriate times all those concerned with the planning and execution of a project to ensure so far as possible their participation and its completeness. One of the problems with networks on large projects is their size and complexity, but the use of summary networks and sub-networks for showing detail is helpful. The larger the project and the greater its complexity, the more there is need for the use of a technique such as network analysis. However,

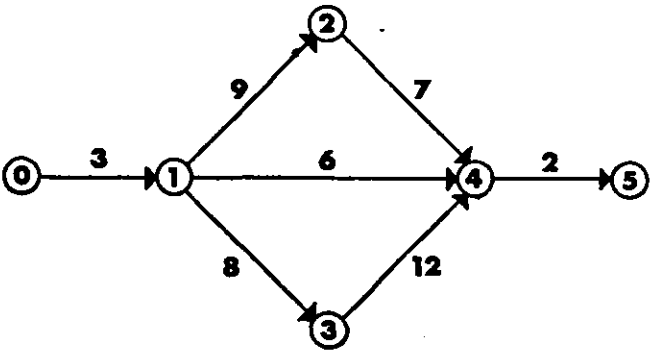


Figure 11: Activity durations

Resources

Confidence

the way in which the method is used should be tailored to the demands of the project. The time required to complete each activity has to be estimated and this can be done at any convenient time during the preparation of the network. One of the spin-offs from the use of networks is that records can be readily available from previous projects from which estimates of the duration of activities may be more accurately prepared. The manpower requirements for each activity should be estimated. The demand for materials and equipment for each activity should be tabulated. Some people are hesitant about supplying estimates of time for work for which they are responsible on the grounds that they may later be held accountable, unreasonably, for delays. It is important that any lack of mutual confidence which engenders such an outlook be overcome at the outset.

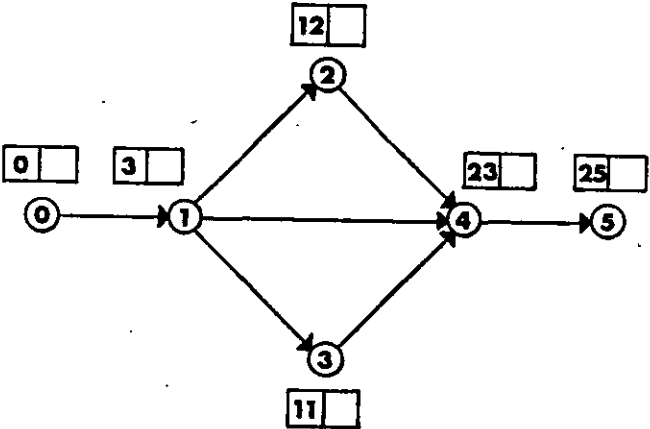


Figure 12: Earliest event times

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MANAGEMENT

FILE REFERENCE 8.30(6)  
Techniques

Parts 1 and 2 deal with the development of networks and the drawing of the diagram. This sheet deals with analysis, allocation of resources, and up-dating and reviewing the network.

● NETWORKS Part 3

30.21 Analysing the network

**Earliest event times**

With the network completed and the estimates of activity durations and of resource requirements prepared, analysis of the network can begin. First, the calculation of the earliest time at which each activity can be completed (earliest event time, EET) should be made. The time estimates may be in any convenient units, eg weeks, days or shifts, but the chosen unit must be used consistently throughout the analysis. The unit used for the purpose of the example analysis is days, and fig 11 shows the estimated duration of each activity against the activity arrow. All activities terminating at an event require to be completed before that event takes place. Earliest event times for each event are calculated by adding together the durations of the preceding activities which lie on the longest time path (see fig 12).

For figures 11 and 12 see data sheet 8.30(5)

The left-hand square of the double rectangular box beside each event in fig 12 shows the earliest event time calculated from the activity durations given in fig 11. The times are calculated as follows:

Event	Durations	Earliest event time
0	0	0
1	3	3
2	3+9	12
3	3+8	11
4	$\begin{cases} 3+6=9 \\ 3+9+7=19 \\ 3+8+12=23 \end{cases}$	23
5	23+2	25

The total project time is 25 days. In the case of event 4 (fig 11), activity 1-4 (6 days) and combined activities 1-2 plus 2-4 (16 days) do not take as long as the combined activities 1-3 plus 3-4 (20 days), and therefore there is spare time available on those paths (see float below). To calculate this spare time, latest event times are established (see fig 13). The latest event time (LET) is that by which an event must take place if the total project time is not to be exceeded.

The right-hand square of the double rectangular box beside each event in fig 13 shows the latest event time calculated in the reverse way to that used in calculating the earliest event times, ie by substituting the durations of succeeding activities which lie along the longest path. The times are calculated from those given in figures 12 and 13 as follows:

Event	Durations	Latest event times
5	25	25
4	25-2	23
3	23-12	11
2	23-7	16
1	$\begin{cases} 23-6=17 \\ 16-9=7 \\ 11-8=3 \end{cases}$	3
0	0	0

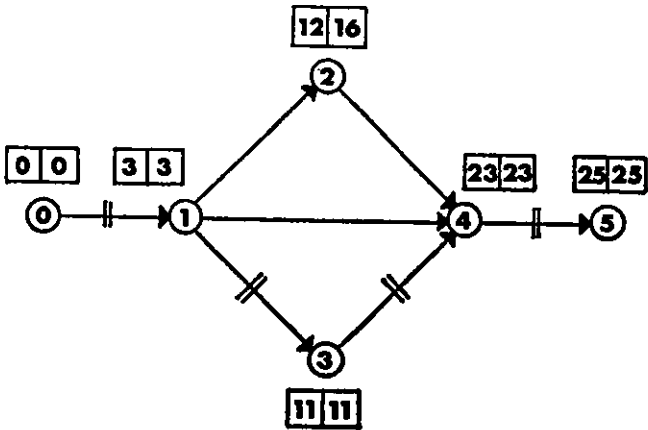


Figure 13: Latest event times

The double rectangular box has been used to contain the earliest and latest event times; but other conventions, eg circles and squares, may be used. An examination of fig 13 shows that certain events (1, 3, 4 and 5) have the same earliest and latest event times. Clearly for these events the duration of the activities cannot be delayed without increasing the total project time. Thus these activities are said to be 'critical', and the critical path is that which links critical activities. It is usually shown by double lines on each arrow (see fig 13), or by a thick line. Activities which do not lie on the critical path have spare time available, which is known as 'float' ('slack' in PERT). Total float is the time available between the earliest and the latest finishing time for an activity and is calculated as follows:  $43 - (21 + 7) = 15$  days (see fig 14).

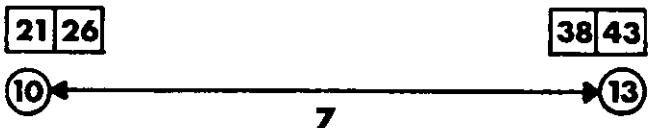


Figure 14: Float

**Free float** Free float is the time available between the earliest finish of an activity and the earliest start of the next activity and is calculated as follows:  $38 - (21 + 7) = 10$  days (see fig 14). **Independent float** Independent float is the amount of float which an activity has when the preceding activity starts at the latest time, and the succeeding one at the earliest time, and is calculated as follows:  $38 - (26 + 7) = 5$  days (see fig 14). **Interfering float** Interfering float is the difference between total float and free float, ie  $15 - 10 = 5$  days (see above). **Negative float** If specific start or completion dates for an activity are determined independently, and the completion date is due before the activity is planned to be finished, negative float will result. Its amount will be the difference (in days) between the latest event time in the network, and the specified completion date.

## 8.30(6) MANAGEMENT

As networks are not drawn to a time-scale and are therefore difficult to 'read', it is helpful to prepare a bar chart from the network showing the duration of each activity, the earliest and latest event times, and the available float. The critical activities can be clearly identified. A bar chart is useful for operational control as well as for planning purposes. However, the need to up-date bar charts during the course of works makes redrawing a time-consuming activity, and flexible systems on boards or planning frames are therefore particularly useful.

### 30.22 Resource allocation

Resources include manpower, materials, plant and equipment, and finance. Manpower can be dealt with in gangs, or in particular skills, or in any convenient form. The time-scaled bar chart of activities forms a basis for the compilation of resources needed week by week to complete the work. For example, dealing with each skill or trade separately, the numbers required for each activity (in units of days or weeks as desired) are estimated and written on the chart. The figures for each trade are summed on a daily or weekly basis and these can then be plotted as a histogram (see fig 15).

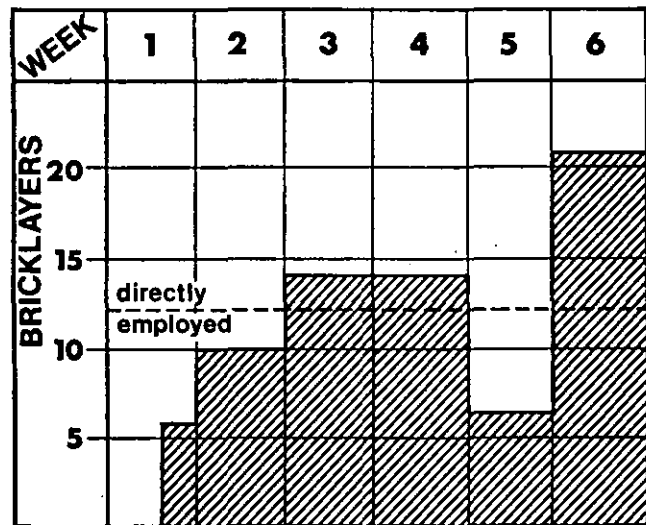


Figure 15: Resource needs — bricklayers

When this process has been completed for all resources, the total demands are known and can be compared with the resources that are available within the organisation. If there is a shortfall or surplus, these can be met by resource smoothing, ie moving non-critical activities to be carried out in periods of float without affecting the overall time for the project. Alternatively additional resources can be brought in to assist, or the programme for completion of the scheme can be extended. Resource levelling, which seeks to maintain a steady rate of resource utilisation, may also be used as a basis for resource allocation.

Smoothing

Levelling

### 30.23 Up-dating and review

The network is composed of many estimates of activity durations which have been made in advance of the work being begun, and during the progress of the works it will usually be found that some parts of the work take longer than expected and yet others are completed sooner. Regular review of the network is required and adjustments should be made to the programme after the revised network (which deals only with activities that remain to be done) has been re-analysed so as to ensure as far as possible that target dates are met and resources deployed most effectively.

### 30.24 Using the computer

For many jobs networks are best drawn and analysed manually, but networks for large and complex jobs may be plotted and analysed by computer, though the sequence and relationships between activities need to be determined first. There are a number of standard programs available, and 36 of these have been surveyed by Internet (UK) and Loughborough University (see *Bibliography*, Staffurth and Walton). The authors identified two main classes of program: the comprehensive package which provides all facilities but can be complex and expensive to use; and the smaller package which has limited facilities but aims to be cheap and simple to use. They concluded *inter alia* that:

Tardy

Smaller network

Greater input

Complicated

- (i) it takes a considerable time and many runs to get the best results from a program;
- (ii) when there are overlapping activities, precedence networks are smaller than the equivalent arrow networks, unless the latter be drawn for a program with 'transit line' facilities;
- (iii) although the precedence network can often be smaller than the equivalent arrow network, the amount of input data required for the precedence program may nevertheless be greater;
- (iv) analysis of precedence networks containing start-to-start and finish-to-finish relationships is not as straightforward as it may seem.

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# MANAGEMENT

## FILE REFERENCE 8.30(7) Techniques

Parts 1, 2 and 3 deal with the development of networks, drawing and analysing the network, allocating resources, and up-dating and reviewing the network. This sheet deals with details of activity-on-node networks which are not covered in Parts 1, 2 and 3, particularly with precedence networks, and the German RPS system.

### ● NETWORKS Part 4

#### 30.25 Precedence networks

**Definition** A precedence network and precedence relationships are defined in BS 4335: 1972 (*see bibliography*) as 'an activity-on-node network in which a sequence arrow represents one of three forms of precedence relationship, depending on the positioning of the head and the tail of the sequence arrow. The relationships are:  
'(1) Start of activity depends on finish of preceding activity, either immediately or after a lapse of time (denoted by *N*).  
'(2) Finish of activity depends on finish of preceding activity, either immediately or after a lapse of time (denoted by *F*).  
'(3) Start of activity depends on start of preceding activity, either immediately or after a lapse of time (denoted by *S*).'  
These relationships are shown in the following diagrams which are based on the BS recommended symbols for use in precedence networks.

Relationship 1

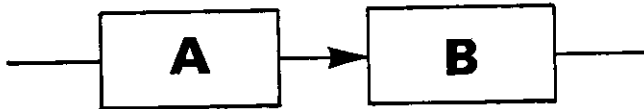


Fig 16a: B cannot start until A has finished

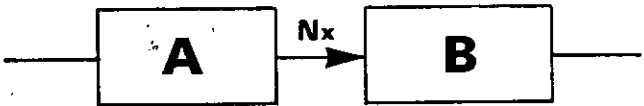


Fig 16b: B cannot start until x days after A has finished

Relationship 2

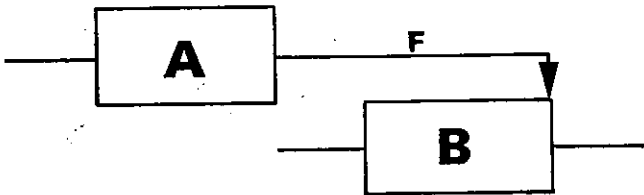


Fig 17a: B cannot finish until A has finished

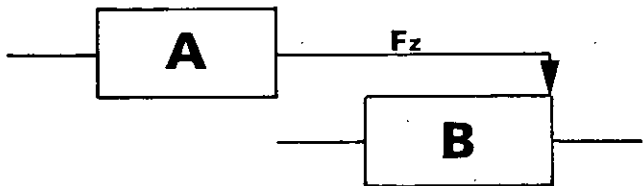


Fig 17b: B cannot finish until z days after A has finished

Relationship 3

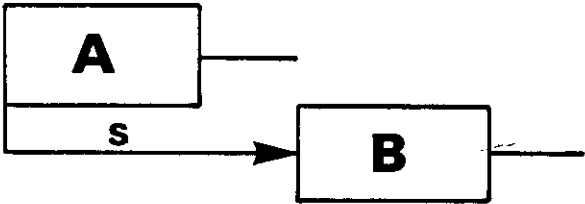


Fig 18a: B can start at the same time as A but not before

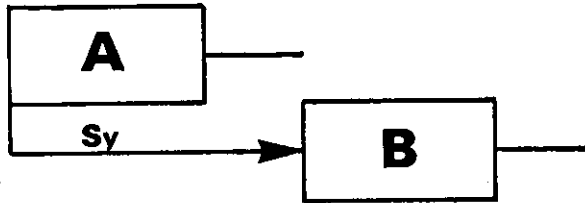


Fig 18b: B cannot start until y days after A has started

**Activity data** The recommended form of recording activity data at a node in activity-on-node networks is shown in fig 19. Extra information, eg resource details and cost code, may be added. Preferred practice would be to show this within the box for activity number and description.

Earliest Start time	Duration	Earliest Finish time
ACTIVITY NUMBER		
ACTIVITY DESCRIPTION		
Latest start time	Free float	Latest Finish time

Fig 19: Activity data form



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30.26 The German RPS system

RPS (Regeltechnischen planung und stueuerung) is the name of a planning and control technique developed by Dr Schleip (*see bibliography*). It is based on the theory of the regulating circuit and it is a critical path analysis system which is said by the authors to have advantages over other networks in both the method of representation, and in its calculation time.

RPS symbols

The graphical representation of the procedures with technological sequence and connecting instructions corresponds to the signal-flow diagram of the control techniques:

Block

The block represents a procedure, a time-consuming and defined event of any kind.

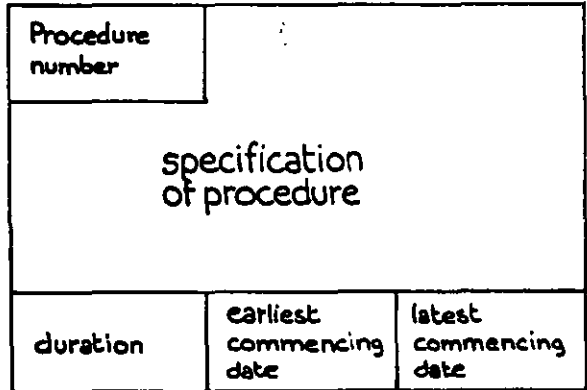


Fig 20: Subdivision of RPS block

Arrow

The arrow portrays a logical connection to the next procedure. It therefore stands for a directed signal.



Fig 21: Control sequence

Dot

A dot marks a branching point; from this point, two or more arrows run to other procedures, which may begin at the same time.

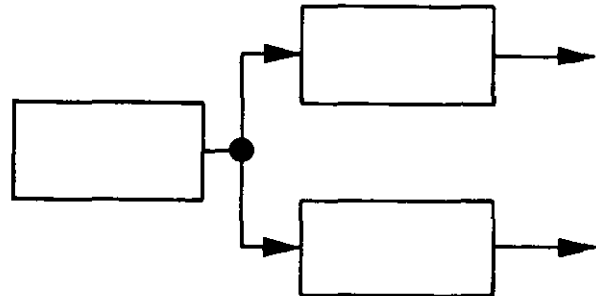


Fig 22: Branching point

Circle

A circle shows a collecting point, into which run arrows from several procedures, which must be completed before the start of the next procedure.

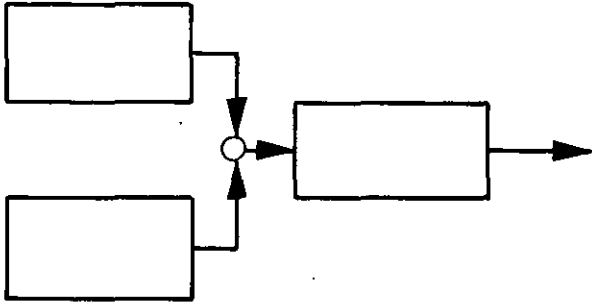


Fig 23: Collecting point

Directing network

Fig 24 shows a directing network with two parallel flows. Procedures 2 and 3 can begin together after the finish of procedure 1. Procedure 4 cannot start until procedure 2 has finished, but it is independent of procedure 3. Procedure 5 cannot start until both procedure 3 and procedure 4 are finished.

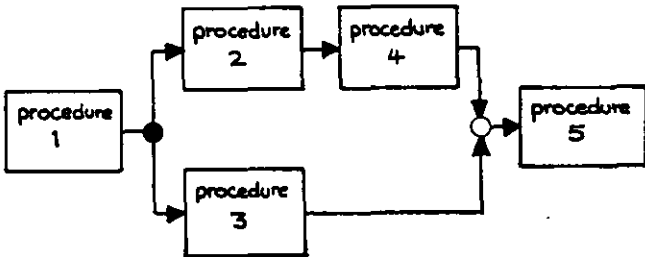


Fig 24: RPS diagram with directing network

Total management system

The authors state that the RPS system is more than a critical path technique. 'It is really a planning and control technique for management. It would be even more accurate to describe it as a planning and control technique based on information feedback, for every planning stage within the system is, from the outset, geared with control in mind. It is therefore a deliberate step towards realising "management by exception", ie preplanning and controlling all the major projects undertaken by the organisation, leaving managers time to concentrate on deviations from the plan.'

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Data Sheets 8.30 (4), (5), (6) and (7) Networks.    Commentary

People generally find it convenient to deal with matters in sequence and tend to complete one part of a job before commencing on another. Even simple jobs which could be organised for at least some items to be done in parallel are dealt with sequentially, and this is one of the reasons for underspending on annual budgets. A systematic yet simple way of pre-planning (and subsequent re-planning) jobs is needed and could be used even by those who are presently satisfied with sequential working. Networks provide such a method because without even drawing a network a good deal of pre-planning work is done simply by thinking through the work that is to be done, and preparing a possible sequence of events. While many jobs would be eased by completing the network (even office routines can usefully be drawn as networks - e.g. preparing new house type plans), the most significant results are likely to be obtained with the most complex of jobs where pre-planning and subsequently controlling work may make the difference between commercial success or failure. The biggest danger is likely to be an over-concern with detail to such an extent that the real value of the method is lost.

The same potential criticism applies to techniques generally, and it is for this reason that the introduction to sheet 8.30 (4) emphasizes that this method is a tool of management, and must not become an end in itself.

# MANAGEMENT

## ● BANWELL ON CONTRACTS

### 31.1 Background

Terms of reference

A committee whose chairman was Sir Harold Banwell was appointed in October 1962 'to consider the practices adopted for the placing and management of contracts for building and civil engineering work; and to make recommendations with a view to promoting efficiency and economy'. The committee concluded that the industry and its associated professions as a whole had not moved forward with the speed and purpose of its more progressive members, and that this was largely due to the fact that the various sections of the industry acted independently. They believed that the most urgent problem was to get the industry thinking and acting as a whole, which would involve a change in attitudes and procedures within the professions. The recommendations made by the committee, which are summarised below, involve changes in practices and procedures relating mainly to work of new construction, although many of them are equally relevant to maintenance and repair. A number of changes have taken place in the matters discussed during the period since the report was published.

Unity

### 31.2 The team in design and construction

Pre-contract planning

Insufficient time is spent in clarifying the needs of the client and in programming the work. Among other things this inadequacy may lead to an excessive number of claims. There should be a recognised standard of workmanship for any job, irrespective of its size.

Professional team

The increasing complexity of building and civil engineering projects demands that the professional team of engineers, architects, quantity surveyors and specialists (including consultants who may be contractors) be set up for each job at the outset. It is wrong to regard design and construction as separate entities and there will be times when the main contractor should be appointed and brought into the team before the design has been completed and the programme settled.

Professional restrictions

In civil engineering those with professional qualifications can be engaged by client or contractor; similar freedom appears not to apply equally to other professions and the case for retaining restrictions should be examined. Common education and training of those engaged in design and those in building is required. Good site management is vitally important and more attention should be paid to the status and training of site agents.

Site management

### 31.3 Appointing the contractor

Selective tendering

If some selection as regards the suitability of contractors for particular kinds of work is used before tenders are invited, competition between contractors is likely to be more effective. On occasions direct negotiation with one, two or three contractors may be preferable. Invitations to tender should be restricted to a realistic number of firms all of which are capable of carrying out the required work (large or small) to a recognised standard.

Restrictive standing orders

Two-stage tendering

Serial contracting

Standardisation and industrialisation

Negotiated contracts

Standing list

Ad hoc list

Alternative tenders

## FILE REFERENCE 8.31(1) Official reports

*This sub-series of sheets summarise the main provisions of recent official reports that have a bearing on management. This sheet deals with the Banwell report, The placing and management of contracts for building and civil engineering work, HMSO, 1964.*

Local authorities' standing orders require to be rewritten to remove the present bias towards open tendering. Full pre-planning before inviting tenders should be the aim.

Advantages may be gained from early co-operation with a contractor, and public authorities should not be deprived of the opportunity to take advantages deriving from the early appointment of the contractor simply because of the need to adhere to outmoded procedures.

Competition may be secured in such circumstances by a 'two-stage' procedure whereby the selected firms first compete on the basis of management ability, plant capacity, labour rates, prices and overheads. In the second stage the successful contractor works as a member of the team assisting in the detailed work, subsequently pricing a bill of quantities which becomes the contract sum.

Regarding each job as unique involves separate documents and different organisations for each one. By providing continuity of work (possibly by serial contracting), the duplication of work and the disbanding of organisations on completion of a job can be avoided.

There should be standardisation of products for efficiency and economy, and as much work as possible should be undertaken off-site.

Contracts negotiated with a single contractor may sometimes produce the best results and this should not be ruled out in the public sector simply because it is unorthodox; the test should be 'is it the best solution?' Public authorities should be able to take advantage of modern techniques, industrialisation and modernisation to achieve the 'best buy'.

### 31.4 Procedures

A standing approved list of contractors for selective tendering should be compiled on a fair and reasonable basis from firms which respond to a public advertisement by the authority of their intention to make a list. The list should be amended from time to time by including promising new firms and deleting unsatisfactory ones. Alternatively an *ad hoc* approved list may be compiled for each contract following public advertisement.

Authorities should exercise their discretion about the number of firms to be included in the short list for each job.

Firms on the standing list should be given, as far as practicable, equal opportunities to tender for jobs over a period. Four weeks should be the minimum tendering period for other than minor works.

A tender based on a fully documented feasible alternative should be assessed on its merits and not disregarded simply because it detracts from the principle of parity of tendering. Results of tendering should be promptly notified to those concerned.

The submission of priced bills of quantities, with the tender, which is the practice in civil engineering, should be extended to all work. When the contract has been let, each tenderer

	should be supplied with a list of tenderers and a separate list of tenders. Adequate time for pre-planning the works must be allowed between acceptance of a tender and commencement on site.
Finance	Acceptance of tenders by public bodies should not be delayed by financial procedures of government departments. Finance should be made available to enable forward budgeting to be planned over a period of years. The availability of finance should not be related strictly to the financial year or any other arbitrary dates.
Building standards	The intended replacement of building bylaws by building regulations is welcomed but does not go far enough in that electrical and water installations, and means of escape, for example, will not be covered. Building standards should be dealt with comprehensively within the UK.

31.5 Conditions of contract

A common form	The forms of contract most widely used are the 'RIBA form' for building work, the 'ICE form' for civil engineering work, and 'Form CCC/Wks/1' for both building and civil engineering work by most government departments. This variety of forms causes difficulties which could and should be overcome by the introduction of a common form for all building and civil engineering work. As a first step there should be a common form for building, and a separate common form for civil engineering. The impending review of the ICE conditions would provide an opportunity for a start to be made.
Partial unification	
Scotland	There may be special conditions applicable to Scotland because of differences in the law, but such requirements should be met by supplementary conditions. Standard forms for sub-contracts should also be prepared. Standard conditions which would set out the rights and obligations of both sides should be prepared for minor work carried out for the private customer.

31.6 Bills of quantities

Simplification	Simplification of bills of quantities is desirable and can be achieved provided that adequate supporting information is given on drawings and in specifications. There should be a relationship between the layout of the bills and the programming of the work. The quantity surveyor should be regarded as the 'economist' of the construction industry. Data collated from priced bills should provide a source of cost information to enable uncertainty to be reduced and rational decisions made in the future.
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31.7 Sub-contractors

Authority and responsibility	Sub-contractors should be closely integrated into the construction team; their presence on site demands a clear understanding of where authority and responsibility lie, and effective communication of information and decisions. The main contractor should appoint most sub-contractors but in particular circumstances the client may nominate them, eg for special techniques, where long fabrication periods are involved, or because of quality.
Provisional sums	Provisional sums and pc items should not be included in bills to cover lack of decision-making on details. Main contractors should treat sub-contractors as they themselves would wish to be treated.
The lump	Main contractors should seek the architect's approval to labour-only sub-contracting. The same safeguards should be adopted for this work as apply to other contractor/sub-contractor

relationships. Sub-contractors should be clearly informed, at the time they tender, of their conditions of contract; standard forms of sub-contract should be more widely used; adequate time should be allowed to sub-contractors to plan their work, and results of tendering should be notified promptly to those concerned. In default of payment by the main contractor, the client should pay the sub-contractor direct and deduct the amounts from monies that become due to the main contractor. Organisations which represent sub-contractors should be granted membership of the national consultative bodies in the building and civil engineering field.

31.8 Firm price contracts

Whenever possible contracts should be let on a firm price basis, ie without a fluctuations clause in respect of cost of materials, or labour. A reasonable contract period for firm price contracts is two years, but

- (a) the work must have been pre-planned in all its critical details,
- (b) time for the acceptance of a tender should be short and clearly stated in advance, and
- (c) materials suppliers are expected to quote on a firm price basis for a given period.

Long-term wages settlements would make a valuable contribution to the stabilisation of costs.

31.9 Payments, retentions and incentives

Promptness	Payments by the client to the main contractor and by him to sub-contractors and suppliers should be made regularly and promptly. The main contractor should normally be paid within 21 days of a valuation. To secure prompt payments it may be necessary for local authorities and other public bodies to delegate power to officers to make certain payments. Consideration should be given by the industry to methods of paying for materials and components being manufactured off-site.
Retention fund	Selective tendering reduces the need for a retention fund in case of default, and thus a smaller retention fund will suffice, and in some cases could be entirely eliminated. In general maintenance guarantee bonds are not favoured. Performance bonds may be required where open tendering is used, but selective tendering renders them unnecessary. Tender bonds are not required unless the practice of contractors withdrawing tenders to the embarrassment of clients becomes widespread.
Bonds	In Scotland tenders are binding as soon as submitted, and in England and Wales it may be desirable for provisions to be made in the documents for tenders to be irrevocable for a set period.
Bonuses	Incentive payments to the contractor to complete the work as quickly as possible may be desirable. Bonus payments to the contractor for work completed on time are likely to be more effective than attempting to rely on a claim of liquidated damages.

31.10 Scotland

Union	Practices differ between Scotland, and England and Wales, and steps should be taken to eliminate these differences in the interests of efficiency. The conclusions in this report apply with equal force to Scotland and therefore Scottish interests should be represented in any consultations arising from it.
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A Municipal Engineering Data Sheet

Published by Municipal Engineering Publications Ltd, 178-202 Great Portland Street, London W1N 6NH, telephone 01-637 2400, and printed by Diemer & Reynolds Ltd, Eastcote Road, Bedford MK42 0LA.

This report forms the basis of current practices for the construction industry, and many of its recommendations are still being pursued. For example, the Department of the Environment has only recently announced that they will use the revised (Fifth edition) Institution of Civil Engineers conditions which were published in 1973.

On the other hand, the sheet will appear somewhat dated because some of the recommendations of the report were acted upon long ago.

Nevertheless the report is basic knowledge for the student (for examinations), and indeed for the engineer (in day-to-day practice), and its contents need to be more widely known.

Many people believe that the report deals only with selective tendering which of course is not so, and this sheet should help to redress the balance.

# MANAGEMENT

## ● POTTS on BANWELL

### 31.11 Background

Terms  
of  
reference

In July 1965 the Economic Development Committee for Building appointed a working party, chairman P G Potts, whose terms of reference were:  
(i) To consider the progress and adequacy of the measures taken, or contemplated, for the implementation of the Banwell committee report, in so far as they relate to the building industry; (ii) To consider any other relevant aspects of the placing and management of contracts for building; (iii) To submit reports and recommendations on these matters to the EDC for building as appropriate.  
The recommendations of the working party are summarised in the following paragraphs.

### 31.12 General observations

NJCC

The implementation of the *Banwell* report's recommendations is a continuing process. The National Joint Consultative Committee of architects, quantity surveyors and builders (NJCC) should broaden its membership to include engineering and sub-contracting interests; it should have a full-time secretariat independent of its constituent parts. If these recommendations cannot be implemented, new machinery should be established including a permanent secretariat, on the initiative of the EDC. The inclusion of representatives of sub-contractors' organisations on the joint tribunal for the standard form of building contract (JCT) and on the National Consultative Council is welcomed.

JCT  
and  
NCC

### 31.13 The team in design and construction

Programmes  
of  
work

Insufficient attention is given to pre-planning and therefore the NJCC should consider publicising the following booklets and encouraging their wider use by both the industry and clients: *Plan before you build*, NJCC 1955; *Building project management—a guide to procedure*, NJCC 1963; *Plan of work for design team operation*, RIBA 1964, and *Preparing to build*, Ministry of Public Building and Works (MPBW) 1965. Copies of *Preparing to build* should be sent to all building clients in the public sector by the appropriate government department, including a special version to statutory undertakers. Design and construction are not two separate entities but little progress has been made in bringing the contractor in at an early stage, and there should therefore be more experiment in the early collaboration of the contractor in the design team. The MPBW should undertake such experiments and issue guidance on the matter. Restrictions on professional people undertaking employment in firms should be reviewed and the RIBA and RICS should complete an examination of their rules quickly which will meet the spirit of the Banwell committee report (*data sheet 8.31(1), 31.2*). The Department of Education and Science (DES), the University Grants Committee (UGC), and the several professional institutions, should encourage training in the building industry's several disciplines to be given in one establishment, and the use of common syllabuses whenever possible.

Collaboration

Joint  
education

## FILE REFERENCE 8.31(2) Official reports

The previous sheet (8.31(1)) in this sub-series on official reports deals with the Banwell report. This sheet is on the Potts report Action on the Banwell report, HMSO, 1967.

Variations

The RIBA should initiate the establishment of a clearing house for the exchange of information on education and joint training between the professional institutions. The NJCC should reconvene its sub-committee on post-qualification training and include CEI representatives on it. It should also consider the establishment of a management college for the whole industry. Variations can be reduced by foresight and adequate pre-planning. Architects should issue a copy of *Working with your architect*, RIBA, to their clients. Therefore contractors should prepare explicit programmes of work to assist *inter alia* in the valuation of variations. There should be greater uniformity in the pricing of preliminaries and this too would assist in pricing variations where bill rates may be inadequate. The JCT should consider the operation of clause 11 of the RIBA form (which deals with valuing variations), and revise it if necessary. The JCT should also examine the feasibility of changing the RIBA form to permit, for example, a 'no variation' type of contract to be used in appropriate circumstances.

### 31.14 Appointing the contractor

Selection

Although the use of selective tendering for housing schemes and schools has increased substantially since 1964, its use remains inadequate and the appropriate ministries should encourage its greater use. The DES and the UGC should be given greater freedom to select contractors by unorthodox methods for university building. To encourage selective tendering a booklet *Selective tendering for local authorities*, MPBW, HMSO 1965, was circulated to all local authorities. Local authorities should alter their standing orders in accordance with the new model prepared by the Ministry of Housing and Local Government (MoHLG). Wider circulation should be given to *Early selection of contractors and serial tendering*, MPBW, to encourage more experiment in serial contracting. There is scope for more use of negotiated contracts, especially for larger schemes, and the MPBW should issue advice about procedures for negotiation.

Negotiation

### 31.15 Procedures

Guidance

In addition to the booklets mentioned above, *Handbook of architectural practice and management*, RIBA 1964, and *Code of procedure for selective tendering*, NJCC 1965, should be more widely known, and the practices recommended in all of them adopted by local authorities. More use should be made by local authorities of standing approved list for selective tendering, and the use of the ad hoc list restricted to appropriate circumstances. The RIBA and RICS should draw the attention of their members to the need for adequate time to be allowed to contractors for tendering. Within seven days of tenders being received the three lowest firms should be notified that they are being further considered, and the remainder that they are not; and local authorities should adopt procedures to enable this to be done. The MoHLG should inform local authorities of the

Notification  
of  
results

desirable practice in circulating results of tendering to the firms concerned; the RIBA and RICS should encourage their members to adopt such practice; and the MPBW should encourage government departments and other public bodies to adopt it too.

The Banwell recommendation that priced bills of quantities should be submitted with every tender is too onerous but such bills should be capable of being made ready within two days of a request for them. The NJCC should draw up a code to give effect to this recommendation.

Schemes which are likely to exceed budget cost should not be put out to tender; means should be sought first to increase the budget.

The National Economic Development Council (NEDC) should give attention to the need for greater financial commitment to be attached to forward programmes of work in the public sector to provide firm rolling programmes of work for several years ahead.

Building regulations should be made more comprehensive in scope (*data sheet 8.31(1), 31.4*), they should extend to the whole of Great Britain and they should be interpreted consistently from area to area.

## 31.16 Conditions of contract

The adoption of the RIBA form of contract (with essential modifications for government use) by the government is a crucial step towards more standardised contract conditions for building. The use of the existing standard forms should be encouraged and individual amendments to them should be discouraged. The RIBA and ICE forms should be harmonised and to this end the MPBW should investigate how far clauses having an identical effect in each form may be written in common language.

The JCT should produce as soon as possible a standard form for non-nominated sub-contracts. The National Federation of Building Trades Employers (NFBTE) should consult a body such as the Consumer Council about its model conditions of estimate which is designed for use on small private works, with a view to encouraging its wider use.

## 31.17 Bills of quantities

Public authorities which have hitherto refused to supply information for the RICS Building Cost Information Service should reconsider their decisions. In order that bills and other tendering documents may be more in line with the estimator's requirements and provide better knowledge of the major determinants of cost, the RICS and NFBTE should consider commissioning research on how to obtain better cost information from the tender documents. They should also examine ways of achieving greater uniformity in the presentation and pricing of preliminaries.

The government should ensure that cost research projects are not delayed through lack of funds.

## 31.18 Sub-contractors

There is a need for all sub-contractors, whether nominated or not, to have the same commercial standing, and designers should not be liable to come under pressure from sub-contractors seeking nominated status. These points should be borne in mind when the standard form of contract for non-nominated sub-contractors (*paragraph 31.16*) is being prepared.

The JCT should consider issuing a practice note about default so that all parties to a contract may be fully aware of their rights and responsibilities.

There should be a standard form of estimate for use by non-nominated sub-contractors prepared jointly by NFBTE, the Federation of Associations of Specialists and Sub-contractors (FASS) and the Committee of Associations of Specialist Engineering Contractors (CASEC).

## 31.19 Firm price contracts

Flexible periods

Although firm price contracts do not necessarily result in lower tenders, the MoHLG should urge local authorities to make greater use of them. Contractors should insist on full details being available at tender stage. Two-year limits for firm price contracts are reasonable but should not be rigidly applied. The MPBW should consider fixing a time limit for acceptance of a tender and its example should be followed by local authorities. The construction materials group of the EDC for Building should examine the question of firm prices for materials.

## 31.20 Payments, retentions and incentives

Prompt payments

The appropriate bodies in the private and public sectors should strongly urge the adoption of the following practices:

- (i) the period for honouring certificates should never exceed 14 days and this should be part of a regular procedure for each contract which is well-known to the contractor;
- (ii) when there are a limited number of items in dispute in a certificate, payment of undisputed items should not be delayed;
- (iii) payments should be made on approximate assessments and exact valuations made at quarterly intervals. Sub-contractors whose contract is directly with the main contractor should be paid by the main contractor when payment is due even though the main contractor may not have been paid. The JCT should consider making clause 27c of the RIBA form (which is to ensure that the main contractor has paid sub-contractors before receiving further payments himself) a contractual requirement. Nominated sub-contractors should be required to provide receipts for payments made. Architects and supervising officers should notify nominated sub-contractors of amounts included for them in certificates issued to the main contractor.

The MoHLG should give further advice to local authorities on dealing with payments due to contractors with a view to speeding up the procedure. Similar advice should be given to other public bodies by the appropriate government department. Payment should be made for materials and components in off-site factories.

The system of deducting retention money should be greatly simplified. The early release of retentions to nominated and non-nominated sub-contractors should be compulsory subject to suitable safeguards.

The abolition of retention money should be the long-term aim and as a first step the JCT should make an immediate reduction in their level, with further reductions being progressively introduced.

Bonuses for early completion are not considered suitable incentives.

The proper incentive for consistently good work should be the retention of a firm on an approved list which should lead eventually to its inclusion in a list of firms doing larger and more demanding work.

Notification to nominated sub-contractors

Early release of retentions

Proper incentive

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# A Municipal Engineering Data Sheet

This sheet summarises a report which is now seven years old, though the writer does not think that many of the recommendations have been implemented. Until most of these sheets have been written this may seem slightly out of place in some respects, but other sheets on contract management, etc., will refer to it and put it into perspective. To an extent the same criticism (or reservation) will apply to each of the earlier 'official report' summaries. This report is one which qualifies and amplifies the Banwell report insofar as it applies specifically to building. It is interesting to note that it recommends a management school (as did Maud and Mallaby in the same year) but so far as is known without result.



MANAGEMENT

HARRIS on BANWELL

31.21 Background

**Terms of reference**

In October 1965 the Economic Development Committee for civil engineering appointed a working party, chairman W G Harris, whose terms of reference were: 'To consider the progress and adequacy of the measures taken or contemplated for the implementation of the Banwell committee report in so far as they relate to the civil engineering industry; to consider any other relevant aspects of the placing and management of contracts for civil engineering; to submit reports and recommendations on these matters to the EDC for the civil engineering industry as appropriate'.

31.22 General observations

**Impact on civil engineering**

There are many differences between the building and civil engineering industries, and the *Banwell* report did not differentiate sufficiently between them; the report was so oriented towards building that it has had less impact on civil engineering than it should. One of the industry's great strengths is that civil engineers have a common basic training and qualification, and serve in all its several parts. Corporate members of Civils, Municipals and Structurals are engaged in all parts of the industry.

**Permanent JCC—a JCSC**

Following the completion of the review of the ICE Conditions of Contract by the Joint Contracts Committee (JCC), and of the Standard Method of Measurement (SMM) by the ICE committee, the ICE should take steps to establish the JCC on a permanent basis, thus forming a Joint Contracts Standing Committee (JCSC), on which all parties concerned (Employers\*, Engineers\*, Contractors\* and sub-contractors) would be represented. Its terms of reference should be expanded to enable it to review and advise on all general issues relating to the ICE Conditions and the SMM.

\* Initial capitals for these words in the report and this data sheet denotes that they have the same meaning as in the ICE Conditions of Contract.

31.23 The team in design and construction

**Extent**

Adequate site and soil investigations are an essential prerequisite to good design and to the efficient and economical execution of the works. The soil investigation should be regarded as a professional service; the Engineer should be closely identified with the results. The following principles should be adopted:

- Selection**
- (i) The Engineer should have clear responsibility for determining the extent of the sub-soil investigation required, for approving the methods used and satisfying himself that the work has been properly carried out, and for making the final assessment of the results in so far as they affect the design and specification of the works
- Negotiation**
- (ii) To enable the Engineer to discharge the responsibilities in (i) above, the selection and appointment of the sub-soil contractor should be made by the Engineer or be subject to his agreement
- (iii) Competitive tendering based on price alone is inappropriate to sub-soil investigation and in general the normal method of appointment should be by

FILE REFERENCE 8.31(3)  
Official reports

The first sheet in this sub-series (8.31(1)) deals with the *Banwell* report, and the second (8.31(2)) with the *Potts* report on *Banwell*; this sheet is on the *Harris* report Contracting in civil engineering since *Banwell*, HMSO, 1968.

**Full report**

negotiation with a single firm or with a small number of firms

(iv) Notwithstanding the Engineer's final judgment of the results of the sub-soil specialist's work, the latter should always be required to provide full reports of the investigation, including not only the full factual data, eg bore hole logs, test results, methods, field work etc, but also his (the specialist's) interpretation of results

**Availability**

(v) The Engineer should provide, or make available to tenderers for the main construction contract, the full findings by the specialist, but in so doing there should be no express disclaimer of responsibility by the Employer for the factual matter in the specialist's report.

**Underground services**

The ICE Conditions (1968) are not appropriate to sub-soil investigations and the JCC should draft a new model form of contract for this purpose. The Ministry of Transport (MoT) and statutory undertakers should examine the availability and sufficiency of recorded information about the location of main underground services with a view to recording, and subsequently making available to all who need it, full detailed information on new main services.

**Alternative tenders**

Tender documents should make it clear whether alternative tenders will be considered, and, if so, that they will be treated in confidence; MoT procedures should be more widely adopted for this purpose.

**Collaboration in design**

The scope for collaboration by contractors in the design stage of normal civil engineering projects is usually limited to phasing of work, methods and minor modifications to details or specifications. Collaboration is of most benefit where the job is of exceptional size or complexity, where it is in a developing or original field, where competence in design is broadly shared between Engineer and Contractor, or where the Engineer does not have the necessary experience in the construction method contemplated.

**Post-qualification training**

The ICE index of post-graduate and refresher courses held at universities and colleges is welcomed and the ICE should encourage more post-qualification training and also consider residential courses. Employers should encourage engineers to take part in them. Employers should also support the schemes for training civil engineering technicians and encourage their staffs to obtain the qualifications offered.

31.24 Appointing the contractor

**Selection**

Selective tendering should be adopted by all public authorities. Where local authority standing orders are an obstacle to selective tendering they should be changed. The results of the MoT inquiry into serial contracting should be made available to other public authorities. Authorities which have continuous programmes of work should regard this as an important factor in the selection of firms to be invited to tender. Target price contracts which are designed to give the contractor added incentive do not offer significant advantages for normal civil engineering contracts. If it can be shown that advantages are to be

gained from negotiating contracts, public authorities should be free to use this form of appointment but each case should be judged on its merits.

### 31.25 Procedures

Approved lists	The criteria laid down in <i>Selective tendering for local authorities</i> , HMSO 1965, for obtaining basic information on firms, should be adopted by all concerned, who should state publicly that they have done so. No more than eight tenders should normally be invited for one job.
Periods	The minimum tendering period should be four weeks for normal works, and up to eight weeks for large or complex schemes. The JCSC should consider tendering periods and issue guidance notes.
Errors	The JCC should include a clear definition of what constitutes the tender (ie the tender sum or the rates) in the revised ICE Conditions of Contract. There should be greater uniformity of practice in dealing with errors in tenders and the JCSC should issue guidance on the matter.
Good tendering practice	In too many cases notification of results of tendering are unnecessarily delayed and the following practices should be adopted: (i) Tenderers should endeavour to clear up all points of doubt with the Engineer before tendering, and to submit unqualified tenders (ii) Where a point of doubt has been clarified with one tenderer, all tenderers should be notified (iii) Tenderers should be notified within seven days whether or not they have been included in the short list (iv) Tenders should normally be accepted within four weeks.
Notification of results	When a contract has been let all tenderers should be supplied with a list of firms who tendered, and a separate list of tender prices. Only in the case of the winning tender shall the firms and the price be associated together. This practice should be universally adopted, and all bodies who are in a position to do so should take positive steps to encourage its use.
Rolling programmes	The EDC for civil engineering should urge the preparation and publication of long-term rolling programmes in the public sector wherever it is feasible to do so.

### 31.26 Conditions of contract

Unified conditions	The Ministry of Public Building and Works should adopt the ICE Conditions, when they are revised (suitably modified for government use), for its civil engineering contracts. The ICE Conditions are concerned with work which is to be remeasured and valued whereas the RIBA Conditions are not, but it may be possible in due course to devise a single document for use in both building and civil engineering.
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### 31.27 Bills of quantities

Simplification	There is an urgent need to rationalise, simplify and computerise civil engineering bills of quantities. The ICE should bring together all those concerned with a view to a co-ordinated effort being made to achieve this.
Training	The ICE should ensure that measurement, valuation and cost control (including cost analysis and general statistical work) are adequately covered in the early training of civil engineers. Professional bodies concerned with the training of quantity surveyors should ensure that adequate training in the civil engineering field is given. The ICE should bring together those bodies which are studying cost analysis and estimating to develop rationalisation and uniformity in billing, taking into account the factors which influence contractors in their pricing.
Welfare	The Conciliation Board should urgently review the Working Rule on welfare to make it more

precise and definite. Welfare facilities of the required standards should be provided progressively as the labour force is built up.

### 31.28 Sub-contractors

Co-operation	The Contractor should play a more positive role in bringing together the sub-contractors at an early stage, so that maximum economy and efficiency may be achieved through closely integrated programmes and methods of work. There may be scope for wider use of nominated sub-contracts in the circumstances set out in the <i>Banwell</i> report ( <i>data sheet 8.31(1)</i> , 31.7), and the JCSC should consider means of reducing the present multiplicity of tenders for sub-contracts. On completion of the revision of the ICE Conditions, the Federation of Civil Engineering Contractors (FCEC) and the appropriate sub-contractors' organisations should jointly negotiate standard forms, first for nominated sub-contracts and then for non-nominated sub-contracts.
Standard forms	The JCC should resolve the problems associated with payments and retentions.

### 31.29 Firm price contracts

Periodic review	There should be a periodic review by the government in consultation with the industry of the period of firm price contracts; during such reviews agreement should be reached on the method of dealing with increases which arise from unpredictable government measures. The study of firm prices for materials being undertaken by the construction materials group of the EDCs for building and civil engineering is welcomed.
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### 31.30 Payments, retentions and incentives

	There should be speedy certification and payment of sums due to Contractors, and the rate of interest on overdue payment should be more realistic.
	The mechanics of measurement and valuation should be improved and the ICE and the Association of Consulting Engineers (ACE) should recommend the following practices to members: (i) Valuations based on measurement of work done should be made at quarterly intervals (ii) Intermediate payments should be based on assessments by the Contractor, and by the Engineer (iii) At quarterly valuations the Engineer should certify undisputed points quickly, reserving only the disputed points for further consideration (iv) Payment should be made within 14 days of certification (v) Quarterly certification and payment should be cleared within 42 days, and monthly accounts within 21 days (vi) Sections of work which are clearly identifiable should be finally measured and agreed as work proceeds. Clients should ensure that their procedures do not lead to delays in payment.
Quarterly measurement	
Monthly assessments	
Certification	
Speedy payment	
Payment periods	
Final measurement	
Administration	
	The JCSC should include provisions for payment for off-site materials in the revised ICE Conditions. Retention should be 5% (with a limit of £1,500) for tenders up to £50,000, and 3% for larger tenders.

### 31.31 Claims

Adequate information	The incidence of claims should be reduced and to this end Engineers should make an adequate soil survey, and provide clear drawings with proper specifications and bills; Contractors should supply full details of claims as they arise.
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This third sheet on the Banwell report, this time from the civil engineering point of view, is like the others somewhat dated, though it was only in 1973 that the Institution of Civil Engineers Conditions of Contract had been revised - 9 years on!

It is curious that the parts (building, and civil engineering) of the same industry (construction) should have grown up with such different philosophies as are shown up in the Potts report (data sheet 8.31 (2)), and this one, the Harris report. The Harris report is optimistic about future congruence, but so long as architects and civil engineers have such different training in the U.K., there seems little hope. Perhaps joining the EEC will have a unifying effect, since the writer believes that their architects and civil engineers are more like one profession and so common recognition of qualifications may have a unifying effect.

# MANAGEMENT

## FILE REFERENCE 8.31(4) Official reports

*The Banwell report [data sheet 8.31(1)] deals with the planning and management of construction contracts; this sheet deals with the McEwan Younger report, Organisation and practices for building and civil engineering, HMSO, 1964.*

### ● McEWAN YOUNGER on CONTRACTS

#### 31.32 Background

**Terms of reference** In October 1962 the Minister of Public Building and Works set up a working party, chairman W McEwan Younger, whose terms of reference were: 'To examine the significant differences between the organisation and practices for building and civil engineering in Scotland and those in England and Wales, and to make recommendations with a view to promoting greater efficiency'. The recommendations of the working party, which are limited in the main to matters in which there is a clearly discernible and significant difference in practice between the countries (mainly in building), are summarised below.

There is no good reason why building organisation and practices should differ between the countries. There is a need for unification and simplification of construction processes. Failure to adopt standard conditions of contract, and to adhere strictly to their requirements and to those of Codes of Practice, has created many difficulties.

**Separate trades contracting** Much of the Scottish procedure is designed primarily for separate trades contracting, ie the system of placing contracts whereby several contractors contract direct with the employer for work in single trades, but there is a considerable move towards all trades contracting, ie the system of placing contracts whereby one main contractor contracts with the employer to do all the work though some of it may be sub-let. Improvements in productivity and efficiency are urgently needed. Maximum use must be made of educational and training facilities, and more provided. Recruitment must be improved.

#### 31.33 Finance

**Cash flow** The building industry in Scotland is under-capitalised. The flow of money is slow, particularly in Scotland, and this has serious consequences. The flow of money would be improved if conditions of contract in respect of payments were observed by all, and in this matter government departments and local authorities should set an example by making prompt payments which should not need approval of committees if within the contract sum plus authorised variations. Financial difficulties have a most adverse effect on productivity, efficiency, and general morale. It is important that in selecting a contractor his financial resources be taken into account.

#### 31.34 Organisation of the construction industry

**Similarities** There are no really significant differences in the broad structure of the industry in Scotland and in England and Wales, except perhaps in the distribution of firms and the arrangements for negotiation.

In England and Wales 89% of all operatives, and in Scotland 86%, were employed by firms having fewer than 20 operatives. Scotland has a much higher proportion of specialist firms than does England and Wales.

The organisation of the industry, and the arrangements for liaison among its various parts, and with major clients, is very complex, particularly in building, but the practical problems are less acute in England because it contains the national (ie applicable to all Great Britain) bodies and their headquarters. Considerable simplification is both desirable and possible, and this should be reviewed as a matter of urgency by the industry itself. There should be the closest co-operation between English and national bodies on the one hand, and their Scottish counterparts or branches on the other.

#### Simplification

#### Unification: conditions of employment and wages

Trade organisations, of both contractors and operatives, should become fully representative of all trades. There should be national negotiation arrangements for wages and conditions of employment for all trades, and arrangements in Scotland and in England and Wales should be made fully comprehensive pending unification. There should be common negotiation arrangements for both building and civil engineering.

#### 31.35 Contractual practices

#### All trades contracting and consortia

The separate trades contracting system is rapidly going out of favour in Scotland, and there is a steady trend towards all trades contracting which should be accelerated, although many firms lack the necessary experience in this work. A force of trained site agents and foremen should be built up. Smaller firms engaged in main contracting may form consortia with advantage so as to enlarge the scope of their work. The practice of inviting tenders for both separate trades and all trades contracting for the same work simultaneously should be discontinued.

#### Selective tendering

Selective tendering is preferred to open tendering. The practices recommended in codes of procedure for tendering should be observed, eg there should be  
(i) sufficient pre-tender information  
(ii) sufficient time allowed for tendering  
(iii) prompt notification of results, and  
(iv) the work should be pre-planned.

# MANAGEMENT

## FILE REFERENCE 8.31(3) Official reports

### ● HARRIS on BANWELL

#### 31.21 Background

Terms of reference

In October 1965 the Economic Development Committee for civil engineering appointed a working party, chairman W G Harris, whose terms of reference were: 'To consider the progress and adequacy of the measures taken or contemplated for the implementation of the Banwell committee report in so far as they relate to the civil engineering industry; to consider any other relevant aspects of the placing and management of contracts for civil engineering; to submit reports and recommendations on these matters to the EDC for the civil engineering industry as appropriate.'

#### 31.22 General observations

Impact on civil engineering

There are many differences between the building and civil engineering industries, and the *Banwell* report did not differentiate sufficiently between them; the report was so oriented towards building that it has had less impact on civil engineering than it should. One of the industry's great strengths is that civil engineers have a common basic training and qualification, and serve in all its several parts. Corporate members of Civils, Municipals and Structurals are engaged in all parts of the industry.

Permanent JCC—a JCSC

Following the completion of the review of the ICE Conditions of Contract by the Joint Contracts Committee (JCC), and of the Standard Method of Measurement (SMM) by the ICE committee, the ICE should take steps to establish the JCC on a permanent basis, thus forming a Joint Contracts Standing Committee (JCSC), on which all parties concerned (Employers\*, Engineers\*, Contractors\* and sub-contractors) would be represented. Its terms of reference should be expanded to enable it to review and advise on all general issues relating to the ICE Conditions and the SMM.

\* Initial capitals for these words in the report and this data sheet denotes that they have the same meaning as in the ICE Conditions of Contract.

#### 31.23 The team in design and construction

Adequate site and soil investigations are an essential prerequisite to good design and to the efficient and economical execution of the works. The soil investigation should be regarded as a professional service; the Engineer should be closely identified with the results. The following principles should be adopted:

Extent

(i) The Engineer should have clear responsibility for determining the extent of the sub-soil investigation required, for approving the methods used and satisfying himself that the work has been properly carried out, and for making the final assessment of the results in so far as they affect the design and specification of the works

Selection

(ii) To enable the Engineer to discharge the responsibilities in (i) above, the selection and appointment of the sub-soil contractor should be made by the Engineer or be subject to his agreement

Negotiation

(iii) Competitive tendering based on price alone is inappropriate to sub-soil investigation and in general the normal method of appointment should be by

Full report

negotiation with a single firm or with a small number of firms

Availability

(iv) Notwithstanding the Engineer's final judgment of the results of the sub-soil specialist's work, the latter should always be required to provide full reports of the investigation, including not only the full factual data, eg bore hole logs, test results, methods, field work etc, but also his (the specialist's) interpretation of results  
(v) The Engineer should provide, or make available to tenderers for the main construction contract, the full findings by the specialist, but in so doing there should be no express disclaimer of responsibility by the Employer for the factual matter in the specialist's report.

Underground services

The ICE Conditions (1968) are not appropriate to sub-soil investigations and the JCC should draft a new model form of contract for this purpose. The Ministry of Transport (MoT) and statutory undertakers should examine the availability and sufficiency of recorded information about the location of main underground services with a view to recording, and subsequently making available to all who need it, full detailed information on new main services.

Alternative tenders

Tender documents should make it clear whether alternative tenders will be considered, and, if so, that they will be treated in confidence; MoT procedures should be more widely adopted for this purpose.

Collaboration in design

The scope for collaboration by contractors in the design stage of normal civil engineering projects is usually limited to phasing of work, methods and minor modifications to details or specifications. Collaboration is of most benefit where the job is of exceptional size or complexity, where it is in a developing or original field, where competence in design is broadly shared between Engineer and Contractor, or where the Engineer does not have the necessary experience in the construction method contemplated.

Post-qualification training

The ICE index of post-graduate and refresher courses held at universities and colleges is welcomed and the ICE should encourage more post-qualification training and also consider residential courses. Employers should encourage engineers to take part in them. Employers should also support the schemes for training civil engineering technicians and encourage their staffs to obtain the qualifications offered.

#### 31.24 Appointing the contractor

Selection

Selective tendering should be adopted by all public authorities. Where local authority standing orders are an obstacle to selective tendering they should be changed. The results of the MoT inquiry into serial contracting should be made available to other public authorities. Authorities which have continuous programmes of work should regard this as an important factor in the selection of firms to be invited to tender. Target price contracts which are designed to give the contractor added incentive do not offer significant advantages for normal civil engineering contracts. If it can be shown that advantages are to be

8.31(4) MANAGEMENT

31.36 Conditions of contract

Different conditions of contract	<b>(I) Building</b> The Scottish general conditions of contract are in general use (often with modifications) throughout Scotland, and the RIBA form of contract in England and Wales. There are important differences between them in respect of, eg. ability to withdraw a tender, treatment of errors, retentions, fluctuations, provisional and p c sums, and extensions of time. It would be a considerable advantage to have a standard form applicable throughout Great Britain based on the RIBA form but always including a specification as part of the contract, and the drafting of these conditions should be undertaken by a fully representative body. Only standard variations to the new form should be permitted. In the meantime, the provisions for retentions and payments contained in the RIBA form should be applicable in Scotland. The Scottish conditions should be revised by representative bodies in line with the RIBA form as far as possible as a first step towards unification of the conditions. There should be a standard form or forms of sub-contract.
Common form	
Standard form	<b>(II) Engineering</b> There are national standard forms of contract for mechanical and electrical, and for civil engineering work. Eventually there should be one standard form of contract for building and civil engineering work.

31.37 Measurement

Different forms	<b>(I) Building</b> There are two systems in use: the <i>Scottish mode for the measurement of building works</i> (devised for separate trades contracting), and, in England and Wales, the <i>Standard method of measurement of building works</i> with its simplified version the <i>Code for the measurement of building works in small dwellings</i> .
Common form	A single method of measurement (incorporating the best features of the two existing methods) and applicable throughout Great Britain should be introduced as soon as possible. The new method should reduce the number of items to be measured. In the meantime, the fifth edition of the <i>Standard method of measurement</i> should be adopted in Scotland.
Standard form	<b>(II) Civil engineering</b> There is a standard method of measurement already in use in civil engineering. Unification of methods of measurement for both building and civil engineering should be encouraged.

31.38 Materials, techniques and standards

Materials	The building industry in Scotland is largely dependent on supplies from England, particularly for manufactured components and fittings. However, there are some materials such as sanitary ware which are sent from Scotland to England in considerable quantities. The production of materials in Great Britain as a whole should be organised to supply the building industry with the necessary materials quickly and economically wherever it is operating. Every effort should be made to increase the output of building materials and components in Scotland. More could be done to assist architects and engineers in their assessment of the possibilities of new materials and techniques.
Techniques	There is growing uniformity in building techniques as between Scotland and England because of the introduction of new materials and techniques, and the increasing use of prefabrication. However, the Scottish climate demands a thorough examination of new systems of construction before their general adoption there.
Standards	In the interests of efficiency the two codes of building standards presently applicable in either Scotland or in England and Wales should be unified as soon as possible. Rationalisation of water supply industry standards would be of considerable benefit to both the water supply industry and the building industry. Consideration should be given to including water standards in a unified system of building regulations.

31.39 Implementation

Setting an example	Recommendations that have been made in the past would have considerably improved the efficiency of the industry if they had been implemented. The industry is ready to accept changes that would lead to greater efficiency. It is of first importance that government departments, local authorities, and other public bodies should give a lead in adopting the recommended procedures in the practice of their contracting arrangements.  List of ME data sheets which summarise the recommendations of official reports dealing with organisation and management in the construction industry  <b>8.31(1) Banwell on contracts.</b> The placing and management of contracts for building and civil engineering work, HMSO 1964 (23 August 1974) <b>8.31(2) Potts on Banwell.</b> Action on the Banwell report, HMSO 1967 (20 September 1974) <b>8.31(3) Harris on Banwell.</b> Contracting in civil engineering since Banwell, HMSO 1968 (18 October 1974) <b>8.31(4) McEwan Younger on contracts.</b> Organisation and practices for building and civil engineering, HMSO 1964 (9 May 1975)
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The McEwan Younger report is often spoken of as relating to contracts in Scotland, but it is a comparison between the practice in Scotland and in England and Wales. The Working party was set up at the same time as the Banwell committee. It is like Banwell, Harris and Potts, a useful examination of contracts practice and should have resulted in changes both north and south of the border. This report seems more important than its lack of popularity would suggest. The writer understands from Sir Harold Banwell (24.3.75) that a further report on contracts is to be published by the Department of the Environment shortly.

# MANAGEMENT

## ● LOFTHOUSE on efficiency in road construction, part one

### 31.40 Background

**Terms of reference**

In June 1965 the Economic Development Committee for civil engineering constituted a working party, chairman J A Lofthouse, whose terms of reference were:

- (i) to examine the economic performance of the road construction sector of the civil engineering industry, especially in relation to costs and productivity; to consider ways of improving its efficiency and performance;
- (ii) in particular:
  - (a) to examine trends of road construction costs and prices and the reasons for them;
  - (b) to consider methods of measuring productivity in road construction, to select the most appropriate and to examine the trends in productivity;
  - (c) to consider action to increase productivity and reduce costs;
- (iii) to submit reports and recommendations to the EDC for the civil engineering industry as appropriate, and draw the attention of the EDC to the possible relevance of its work to other sectors.

Attention was focused on motorway schemes and the largest trunk road schemes in England. No special attention was paid to Scotland or Wales, nor were smaller schemes studied. Many of the recommendations addressed to the MoT (now the Directorate General of Highways, DoE) are applicable in greater or lesser degree to other highway authorities. The recommendations of the first report are summarised below.

### 31.41 Main aims

The main aims which should underlie future developments are:

- Continuity** (i) 'more continuity of work, for plant, for contractors' teams, and for design teams;
- Specialisation** (ii) 'partly as a consequence of greater operational continuity, more specialisation in major highway works; this too applies to plant, contractors' management teams, and design teams equally;
- Fewer contractors** (iii) 'as a means to continuity and specialisation, a more rational distribution of work to a smaller number of contractors' teams and design teams;
- Information** (iv) 'better communications; more feedback from contractors to designers on the practical cost implications of design; clearer statements by the Ministry of the contents of its forward programme, and of the prospects for contractors and suppliers of materials;
- Collaboration** (v) 'more collaborative working between contractors and engineers, between engineers, contractors and statutory undertakers, between contractors and the Ministry: this might include earlier participation by the contractor in the preparation of some projects;
- Costs and benefits** (vi) 'a closer analysis of costs and benefits: in the specification, and in the choice between alternative methods of construction (black top or concrete paving; precast or *in situ* bridge construction; shorter or longer contract duration);

## FILE REFERENCE 8.31(5) Official reports: Lofthouse

*This sheet deals with the first half of the first (interim) report of the working party on costs and productivity in road construction Efficiency in road construction, HMSO, 1966 (the Lofthouse report). In welcoming the report, the Minister of Transport, Mrs Barbara Castle, stated that the initiative required to make most of the recommended changes would have to come from her Ministry.*

**Public accountability** (vii) 'a clearer appreciation of the price of public accountability: in the time and effort devoted to consultations and negotiations before the line of a new road and the right of entry to land are statutorily established; in the Ministry's attitude to the risk of poor performance in the finished road; in its willingness to try out innovations in contract procedure.'

**Change** The industry must accept changes, and these will affect the Ministry's practices, procedures and the framework within which it works, the disposition of contractors and the ways of engineers.

### 31.42 The structure of the industry

**Quality of management** Contractors regard the lack of an assured market for their services as the biggest obstacle to efficiency. The problems of management in road construction are complex and the quality of the contractors' management teams are critical. Technical problems on one job are more similar to those on other road schemes than to those in other civil engineering work. The quality of management will suffer if experienced teams have to be dispersed after jobs through lack of continuity of work. Some special plant is very little used and this places a needlessly heavy financial burden on overheads which has a direct effect on prices. Contractors are thus deterred from investing in the most expensive and specialised plant, or in experimental plant. A major obstacle to greater efficiency and productivity is the lack of assurance of steady and sustained demand for each contractor, and therefore the future disposition of work should provide greater continuity of work for individual firms.

**Limited opportunities** Because the number of major contracts is small at any one time, there can be a continuous programme of work for only a limited number of management teams who specialise in roadworks; thus not many firms can be employed in major contracts. In general there is little prospect of small firms acting as main contractors on large contracts. Both the Ministry and contractors should aim to concentrate major contracts in the hands of fewer contractors' teams.

**Selective tendering** The Ministry should ensure that unsatisfactory firms are relegated and are discarded from the approved list and that its selective tendering procedure enables all firms to have the opportunity to develop in standing and calibre, and in their capacity to take on more contracts at a time. Contractors have their part to play in achieving the benefits of concentration and continuity. Few firms may wish to concentrate exclusively on roadworks but those that do engage in roadworks would do well to make a substantial commitment to it whatever else they may do too. Firms of all sizes should consider the advantages of amalgamation, or of permanently combining their road-construction interest in jointly owned subsidiaries.

**Sub-contracting** The contractor's overriding and primary function is good management; there are misgivings about



### Early completion

### Practical experience

### Specification

### Contribution by contractor

## Information

**Property**

### Uniformity of supervision

### Mains and cables

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## Proliferation of design systems

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FILE REFERENCE 8.31(6)  
Official reports : Lofthouse

*This sheet is the second on the Lofthouse report and it completes the summary of the recommendations of the first (interim) report of the working party on costs and productivity in road construction, Efficiency in road construction, HMSO, 1966, which begins on sheet 8.31(5).*

● LOFTHOUSE on efficiency in road construction, part two

31.45 Contractual relationships

**Benwell**  
The conclusions and recommendations of the Benwell report [data sheet 8.31(1)] point in the right direction; where they are straightforward to apply to large-scale road works, they have been adopted in general with considerable success. Only where the recommendations present special problems, or special advantages in major road works, are they further discussed in this report.

**Selective tendering**  
Three years' experience of selective tendering has been wholly favourable, but in general too many tenders are sought. The MoT and other highway authorities should be content with about four tenders for each contract. Collaborative work between client and tenderer will be greatly helped by a smaller number of tenderers; and if contractors have fewer tenders to prepare, they will have a greater incentive to tender well and also more resources to devote to tendering on each occasion.

**Information**  
Clients should be generous with information when they go out to tender since uncertainty in the contractor's mind about what a job will involve tends to make him raise his price. The MoT should consider whether by giving more time to tenderers to identify any additional information they need, or whether by other means, it can give contractors fuller information about ground conditions so as to reduce uncertainty and therefore their prices.

**Natural materials**  
It is not practicable for engineers to assess all local sources of natural material and guide tenderers in their acceptability; but, without prejudice to the contractor's responsibilities, engineers should make a more general practice of informing tenderers of sources of natural material which they know will be acceptable, and also that nominating sources of material should be tried out.

**Uncertainty**  
Uncertain points in contract documents are likely to increase the tender if not resolved in time. Therefore contractors should be readier to discuss frankly with engineers such points of uncertainty that arise at the tender stage, so that as few as possible remain at the end of the tender period. The engineer's practice in most cases is to give to all tenderers any guidance which he gives to one. He is responsible, however, for distinguishing between information which must be given equally to all tenderers, and ideas which one tenderer can fairly regard as his own property.

**Alternative tenders**  
Contractors should bear in mind the advantages, as well as the disadvantages, of prior discussion on a confidential basis with the engineer of ideas

for departures from the original design. In their own interests they should conform to the MoT's requirements when they submit qualified tenders by submitting prices both for the original design and, separately, for any qualifications they may wish to enter to it.

**Time**  
Eight weeks has been accepted as the normal tender period for larger contracts, but the MoT is extending this to ten weeks. For some jobs the period allowed is uncomfortably short, and it is wise therefore to allow enough time for the contractor who puts most time and effort into the preparation of tenders. If a successful contractor is pressed to get on with the job too soon after the contract is awarded, he will probably make no more than a token start on the required day.

**Claims**  
Early motorway contracts gave rise to claims that were very substantial, and which took a great deal of time and trouble to determine. Current contracts are likely to give rise to fewer and less intractable claims. However, some firms still make a practice of submitting inflated claims, or claims for which there is little basis. This practice is time-absorbing and completely unproductive, and the MoT, when it considers a contractor's suitability for further contracts, should regard an irresponsible attitude to the submission of claims as a factor to be taken into account.

**Forms of contract**  
It is not possible to give contractors responsibility for design of road works because it takes typically five years to select the line for a new road, and this is too long a period for contractors. However, serial contracting has been used with advantage in other construction projects, and an experiment with serial contracting in road work is urgently needed. The generally accepted size of motorway contracts is about six miles, but this has not been arrived at by any analytical process. Therefore the MoT, as a matter of urgency, should commission a study to determine the optimum size of projects, and the optimum phasing of operations for serial contracting in road construction. The Federation of Civil Engineering Contractors (FCEC) and individual contractors should support and co-operate in such a study to the full.

**Early appointment of the contractor**  
The MoT with the agreement of the FCEC should consider an experiment with appointing a contractor for a contract a year or two before the design for the scheme is complete. This may result in a price lower than open competition can procure, because, provided he has a satisfactory financial incentive, the contractor will be applying all his expertise to cost reduction in every phase of the contract.

## 8.31(6) MANAGEMENT

### 31.46 Planning procedures and land acquisition

**Discussion period** Generally about five years elapse from the time the MoT decides to go ahead with a major project to the time it is ready to invite tenders for it; thus the processes take a long time and their duration is uncertain. Useful economies would be gained by shortening preparatory procedures and by making their duration less uncertain. Much time is spent by the MoT in discussions with public authorities and other interests with a view to reaching agreement and thus avoiding the need for a public enquiry. The MoT should consider again the balance of advantage between a shorter duration for the preparatory procedures and a surer outcome in the work of establishing the main line of a proposed road and the treatment of side roads.

**Land acquisition** The statutory processes were designed to provide all the necessary safeguards for the rights of individuals affected by a road construction scheme. In general, therefore, there is no obligation on highway authorities to prolong negotiations with property holders in any way that will delay the start of road works beyond the time the statutory procedures would require. The preparation of the compulsory purchase order can thus start at the same time as negotiations for purchase by agreement. As it becomes possible for a highway authority to start each successive stage of the statutory procedures for land acquisition, it should proceed to do so for any plots which have not already been secured by agreement. The MoT is ready to make an advance payment of 90% of its own estimate of the value of the land when it takes entry under its statutory powers and all highway authorities should make advance payments in order to secure quicker entry to land.

**Compensation** The MoT and other public departments should consider whether some modification can be devised in the arrangements for determining compensation for land required for public works (eg higher payments for quicker settlements) in such a way as to produce worthwhile time savings and consequently cost savings. Highway authorities should consider whether they can forestall difficulties or delays to contractors by offering to compensate property owners for damage in cash, rather than in the form of accommodation works to be constructed by the contractor. The MoT should consider whether there is scope for earlier collaboration between those concerned with land acquisition and those concerned with design in order to reduce the time taken after the layout has been settled. The present arrangements for land registration in this country impose unnecessary delays in the preparation of some road schemes. The whole question of land registration deserves the broadest consideration. The MoT should seek compulsory powers to acquire land to be used by the contractor as working spaces or as access routes where there is little choice. The MoT should develop its published forecasts of the future demand for work in order that they can give a better basis for planning to contractors and others concerned.

**Land registration**

**Individual's rights** It is not possible to say whether highway authorities and the nation are paying too high a price in overall terms for the preservation of the rights of individuals through the three-stage legal process laid down by statute. The broadest consideration should be given to the question whether the real safeguards to the rights of individuals, which the present procedures afford, could not be afforded equally well or better by some shorter and simpler procedure with less serious consequences for efficiency and prices. Highway authorities should not prolong consultations and negotiations with individual property owners and public authorities unduly; they should be able to avoid doing so by good administration.

### 31.47 Costs, prices and productivity

**Increased productivity** The measurement of costs, prices and productivity in road construction is so complex as to require much closer analysis than the working party was able to give to it in this first report before definite and detailed conclusions could be reached. There have been important advances in productivity in the three major phases of road construction: early (1959-61), middle (1961-63), and latest (1963-65). Plant has been used to better effect in earthworks and carriageway construction and structures have been designed more economically. These advances have been counteracted by increases in the client's requirements. They may also be masked by rises in the costs of labour, plant and materials.

**Substantial increases** In consequence the MoT has actually paid substantially more for earthworks and structures associated with each square yard of finished carriageway and only a little less for the carriageway works themselves. Earthworks, carriageway construction and structures account for 70% of the whole. For the rest, drainage, fencing and side road works do not show the same evidence of improved productivity, and preliminaries form an increasingly heavy tax on the job as a whole. Drainage, fencing, side road works and preliminaries deserve attention if road construction costs are to be reduced.

**Economies** There is no doubt that roads can be built more economically. Better value will be realised only if every phase of construction in each mile of road demands fewer real resources—ie if the job calls for less labour, if it makes more economical use of materials and if plant can be used with greater efficiency. All this will require better administration and better planning on all sides of the industry. There is plenty of room for improvements. The recommendations included above identify those areas where the scope for improvement is most obvious and the need for it most urgent.

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MANAGEMENT

FILE REFERENCE 8.31(7)  
Official reports  
Lofthouse (2nd report)

*Sheets 8.31(5) and (6) deal with the first (interim) report of the working party on costs and productivity in road construction. This sheet completes the subject by summarising the recommendations made in the Second report on efficiency in road construction, HMSO, 1967.*

● LOFTHOUSE on efficiency in road construction, part three

31.48 Introduction

**First report welcomed** This report should be read as a supplement to the first report, which was in general warmly welcomed—remarkable, bearing in mind that until then there had been no consensus of accepted opinion and practice within the industry. Many of the suggestions in the report have been acted on, and many comments have been received. Some have emphasised the delay and bother arising from compulsory acquisition of land and property where the land is not registered. The repetitive searching for owners and others with an interest in property is very time-consuming and frustrating. The skilled manpower so engaged could be used to some extent for compiling the basic register, and therefore the Lord Chancellor's department should accelerate compulsory registration of land. Where county councils use their own valuers, the government's rule is that if a government grant is payable, the district valuer's confirmation of the county valuer's settlement is required. This duplicates work and the MoT should review the rule so as to remove this cause of delay and duplication.

**Land registration**

**Quick settlements** The only recommendation in the first report that the Minister felt unable to accept was that the government in some cases should be prepared to make higher payments for quicker settlements in the acquisition of property [*data sheet 8.31(6) ; 31.46*]. Further evidence has been made available of the high costs that can sometimes be incurred by delay on small matters, and the MoT and other government departments should review the possibility of modifying the rules so as to save money in such cases.

**Interim certificates** The system of assessing and certifying interim payments on road contracts is the same as that used in all civil engineering works, and a rational modification of the system is needed. The ICE should give renewed consideration to simplifying this system.

31.49 Contractors, clients and engineers

**Collusion** Fears have been expressed that there will be both more temptation for price collusion, and more opportunity for it if the number of contractors tendering for schemes is reduced. However, the penalties for price collusion are high. The reduced number of tenderers previously proposed [*four, data sheet 8.31(6) ; 31.45*] should be adhered to since it should not impair the intensity of competition.

**Sub-contracting** The nature of road construction is such that work programmes need continual modification, and one effect of this is that the timing of sub-contractors' operations is very uncertain. It has been suggested that major clients should

let functional contracts, eg separate contracts for structural work, for earthworks or for paving. The complete scheme would be likely to take longer under these arrangements and the client has the responsibilities and costs of detailed project management as well as the resolution of disputes that may arise from a later contractor's dissatisfaction with the work of an earlier contractor on the site. A general extension of functional contracting from the limited use it presently has is not advocated.

**Direct labour** True comparison of costs of contracting and of direct labour is impossible because of the difficulty in allocating overheads. It would be exceptional for a single county to have a sufficiently large and even flow of large-scale projects to reap the benefits of continuity of work and of a continually accumulating experience which are so important. There is therefore not much scope for direct labour in the largest road schemes.

**Plant** The demand for road construction equipment at home and abroad is expanding, and although the home market is small, plant manufacturers and users should together seek opportunities to increase the manufacture in this country of specialised road construction plant. Construction costs would be reduced if plant were more extensively used. As the road construction industry and the plant hire industry develop, greater utilisation of plant should follow naturally.

**Contracts** The successful contractor should be required to submit a critical path network for works of any complexity soon after he is appointed. It has been suggested that both cost-plus contracts and target-price contracts should be used. Cost-plus contracting gives the contractor little incentive to reduce his costs and the client little assurance that he is paying a fair price. Thus cost-plus contracts are not recommended. Target-price contracts have been used very occasionally in the road programme but of new forms of contracts this is the only one for which definite advantages can be claimed, and then only in those exceptional cases where unforeseen contingencies are unlikely to arise.

**Administration** A financially independent road board with its own source of revenue was suggested but it raises many issues, which fell outside the terms of reference of the working party, who therefore felt unable to make a recommendation on the suggestion.

**Delegation** In setting up road construction units, the MoT should take the opportunity to redefine the extent and limit of the engineer's role, and devise and apply new systems of control. The MoT should recognise the economies to be made through delegated responsibility and flexible administration as well as the safeguards provided by central control.

## 8.31 (7) MANAGEMENT

### 31.50 Manpower

Disputes	Industrial relations in road construction are remarkably good, as they are also in other sectors of civil engineering; disputes and stoppages are rare.
Working conditions	Data on the labour force are scarce, but the MoT intends to improve the labour returns that are made on each contract. The results should be widely circulated so that other sides of the industry can see the relative magnitude and priority of labour problems in road construction. All civil engineering work is carried out in difficult working conditions; it is arduous, and exposed to weather. Everyday facilities, eg canteens, lavatories and changing rooms, are not easily provided to acceptable standards. Although there is no shortage of recruits, it has been difficult to maintain the quality of the labour force. Better supervisors and technicians are needed. There is a need, too, for training in project management and control, including, for example, techniques such as critical path scheduling. There is scope for more productive use of labour. It is hoped that the RRL's production studies will provide information to guide both contractors and trade unions.
Engineers and managers	Effectively there are four groups of practitioners engaged in road construction: contractors, consulting engineers, local government officers and government officials. It is unfortunate that few senior men have personal experience of work on another side of their industry, except perhaps many years previously and in a junior capacity. Any steps that the government, the industry, or the professions can take to encourage the movement of middle and senior management between groups would promote efficiency in road construction.
Expansion	The main limiting factor on the size of the road programme is finance. The availability of manpower at any level would not be a practical limitation on the acceleration of the road programme to any pace that is likely to be decided on, provided that the load on the rest of the industry was not increased too, and that advance warning of the change of pace was given.

Future studies

Production studies

Information

been supposed. The reason for the increase of 16% in on-site preliminaries as a proportion of the total on-site costs over 1963/65 has not been established. Nevertheless it is doubtful whether it is conducive to good management to spread so large a sum as an overhead, without allocation to particular operations.

The aggregated measurement of costs and of productivity (even if this is possible) will do little to suggest the areas in which improvements in efficiency are to be sought, and therefore a large programme of data collection directed to this end would not be justified. Nevertheless a general check on efficiency should be kept by contractors, engineers and the MoT by using currently available information.

Contractors have no cost benchmark against which to compare the detailed information that they have of their own operational performance. Road construction needs a system for exchanging information to provide individuals and firms with a yardstick against which to measure their own performance. Little inter-firm comparison has taken place. The RRL has undertaken some studies to compare methods of work on different contracts, and the industry has responded well to these investigations. The RRL should continue, develop, and extend studies of production as quickly as its own resources and the contractors' response will allow, and contractors should participate not only in their own interest but also in the general interest. The MoT should collect only those data that serve a purpose whose value is commensurate with the effort required for data preparation, collection and analysis. It should study further, with all sides of the industry, the returns that are already made for manpower and plant employed on each contract. It should continue its studies of methods of estimating requirements for materials, and, with the collaboration of the industry, revise the systems of data collection so that they are as useful and economical as they can be. Further cost studies directed to particular phases of the contract, rather than to contracts as a whole, should be commissioned by the MoT, using larger samples than previously, and contractors should participate in them.

### 31.51 Costs, prices, and productivity

Re-examination	The first report concentrated on unadjusted historic figures [data sheet 8.31(6); 31.47], and the data have since been examined in more detail.
Variability	There are two lessons to be learned: (i) There is extreme variability of road construction costs, and difficulty in measuring trends with a contract sample size as small as twelve. It would require a much larger sample to make a comparative analysis of the trends of cost. This would be expensive, and the number of major contracts available may be too small anyway to give valid results.
New ideas	(ii) The collection of data for particular phases of work has prompted inquiries into the real nature of the work done, and this of itself may provide useful ideas for the development of more economical designs and specifications.
Large overheads	The large changes found in the sample for earthworks costs and structure costs were more attributable to vagaries of terrain than to differences in design and specification than had

### 31.52 Winding-up

Application to smaller schemes

Efficiency in maintenance

The investigations have been directed towards major trunk road and motorway schemes, but the general aims [data sheet 8.31(5); 31.41] and many of the detailed recommendations will apply to classified road schemes and to smaller projects on trunk roads. Maintenance and minor improvements works were not included in the working party's terms of reference, but though there are probably real problems of efficiency in this field, they are different from those in large new road schemes in a number of fundamental respects. If efficiency in this field is to be studied, it should be referred to another group of people. The working party has not succeeded in establishing to its satisfaction any aggregated measure of productivity in road construction. To establish such a measure would be an onerous undertaking whose results would have little validity or usefulness.

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Data Sheet 8.31 (5), (6) and (7) Lofthouse reports 1 & 2.

Commentary

It is a great pity that so many useful reports lie forgotten so soon after they were published. Although this one is concerned mainly with major road contracts, much of its thinking has a wider relevance, and, like most writing, it reflects the conventional wisdom of the period.

It recommends greater specialisation in design, plant, and management teams: fewer but larger design teams, and fewer contractor's management teams. This really is the economy-of-scale argument, but it does not support its recommendations with background data. It merely states that bigger (and therefore fewer) is better. But it does not say how big; it also states that the bigger teams will employ specialists from more fields and that in the bigger teams this specialist knowledge will be available to the rest of the team. This is a doubtful proposition unless the team is very small. Real expertise is difficult to convey to others, and unless the team is small (or at least, the jobs few in number), that expertise cannot in practice be available as suggested, in the writer's view.

The highlighting of the cost of public participation is particularly interesting. The cost is not given, but the need to assess the desirability of incurring that cost is stated, but so far as is known this has not been pursued in any field, but it should be.

The discussion on the quality of management suffering because of dispersal of experience is interesting, and of course has a real relevance to the general local government field where movement for promotion is customary, but well-known to be expensive to the authority in terms of knowledge and experience lost to it when someone (at any level) leaves.

The discussion on standardisation of design is not unusual in civil engineering and is normally accepted as a desirable objective. However, some designers of houses have resisted the concept of standardisation very strongly and one must ask how much is it costing the nation?

The proposal to disseminate new knowledge 'clearly, quickly and universally' fits in entirely with the writer's views, but the first problem is the dissemination of existing knowledge. In the writer's opinion, there should be practice notes prepared for all aspects of civil engineering work.

Note: The reader who is reading the full text should now proceed to Appendix 2 in Volume 1.

