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HIGHWAY ENGINEERS IN LOCAL GOVERNMENT
PROFESSIONALS IN A CHANGING ENVIRONMENT

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Submission for degree of Ph.D.

UNIVERSITY OF KENT AT CANTERBURY

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DECLARATION

I confirm that this thesis is my individual composition, and that none of the material in it (other than the factual information in the figures in Chapters 4 and 5) has been used previously.

ABSTRACT

During the last decade highway engineers in Local Government have experienced major changes in their technical, social and organisational environments. The thesis examines and seeks understanding of the impact of these changes on their tasks, relationships, and motivation. The historical, functional and territorial context of their work is described, and previous writers' explanations of the behaviour of individuals and the functioning of organisations are reviewed.

Following from this review a multiple-network model of organisational relationships is developed. Three-dimensional concepts are employed to portray the needs set and action space of individuals occupying nodal positions in the network. There is particular emphasis on the factors influencing means-ends chains of activity within action spaces, in the light of individual, professional and organisational objectives.

With these models and concepts, the recent changes in the environment of highway engineers in the County of Kent are analysed and categorised. Consequential changes in the function, structure, and interdependence of engineering departments in District and County authorities in Kent are investigated.

These investigations provide the background against which individual relationships and perceptions are set. Responses to questionnaires circulated within the authorities provide information on the function and frequency of links between individuals and groups in the multiple networks, together with reports of the perceived sources of change and job satisfaction. These responses are interpreted diagrammatically. Reports of individual interviews amplify the questionnaire replies, and enable individual perceptions of change, job satisfaction, objectives, and influence to be reported and analysed.

It is concluded that the conceptual framework developed in this study, consolidated in the light of individuals' experiences and perceptions, provides fresh insight into individual and professional activity in the organisational setting, and of the process and consequences of change.

HIGHWAY ENGINEERS IN LOCAL GOVERNMENT - PROFESSIONALS
IN A CHANGING ENVIRONMENT

CHAPTER 1

THE CONTEXT OF THE STUDY

1.1. INTRODUCTION

This study is concerned with a particular group of professionals - highway engineers - working in the bureaucratic world of local government. Under the influence of external pressures, and in particular of central government legislation and directives, this world has changed over the decade between 1973 and 1983. As a member of that group, the author has experienced the period of change and observed its outcome, not only in the form of new organisations and new procedures, but also at the more personal level of changed influence, activities and relationships among the network of individuals and specialist groups responsible for maintaining and enhancing the highway system of Kent. It is the author's experience of the changes, and questioning of their significance and impact, which has led to this investigation.

The object of the study, then, is to seek an understanding of individuals' reactions to this changing environment, and in particular of its effect on their decision-making, autonomy and satisfaction in their chosen occupation, and on their relationships with their colleagues. As such it will take a "bottom-up" view of organisations, concerned with people more than policies and relationships more than regulations.

Handy (1976 p.21) suggests that there are four stages in the process of understanding: exploration, conceptualisation, experimentation, and consolidation. The first stage - exploration -

involves a review of the explanations and descriptions others have given of the workings of organisations and the activities of their members. There is an abundance of riches in the organisational and motivational literature, but for personal understanding to develop, these ideas must be assimilated and internalised in the process of conceptualisation. Concepts are the framework on which impressions are rationalised, and events generalised. Without concepts, experience would merely be anecdotal. Colloquially, concepts may be taken to be "something to do with how we use language; or how we structure our experience or with how we categorise the objects we have to deal with ..." (Toulmin 1972, p.8). From an exploration of the language, structures, and categories used by other writers to transmit their understanding of organisations and of the behaviour of their members we will wish to develop concepts which are relevant to actual experience over the last decade.

For Handy the test of conceptualisation is experimentation. Perhaps "experimentation" has too scientific a ring for a qualitative study of this nature, and "application" would be preferable. Certainly we will wish to apply the concepts developed from the exploration of relevant literature to the events and consequences in highway authorities over the last decade. Indeed the object of this study is to categorise events and explain consequences. At this stage in understanding there is a measure of iteration: if concepts provide explanations for experiences, then a study of those experiences must lead to a refinement in the concepts. So the final stage of the investigation will be "consolidation" - bringing with it a restatement of concepts, and an evaluation of the extent to which the approach adopted in the study might advance or integrate motivational or organisational theory.

1.2. ORGANISATIONAL CONTEXT

Before relating the four stages in understanding more directly to the approach of this study it is necessary to set it in its organisational and historical context. In fact the study took place in a readily identifiable system. Organisationally it is restricted to the 14 district councils and single county council responsible for the management and maintenance of highways in Kent. The group of professional engineers responsible for highway work in these authorities is clearly defined, but the interdependence of officers and councillors is such that elected members must also be taken to be part of the internal organisation network rather than (and this would be an alternative approach) political influences in its environment. Central government, however, with its departments of state and their officials is considered to be outside the intra-organisational network, though a significant element in its environment.

To select this group of professionals (1) for study at a time of change has a double advantage. Because the majority of those making up the network have a shared body of knowledge, contribute to a common function, and are employed in similarly constituted bureaucracies they can be anticipated to share a core of values, attitudes and experience. Because they have, over the last decade, experienced change, the network of relationships and responsibilities in which they operate has been dynamic rather than static. It must be the case that individual reactions are more readily studied during a time of adjustment than when they are in equilibrium. We are seeking to develop concepts which will provide a framework for understanding the influence of a period of change on this group of professionals rather than studying professionalism or change per se.

It is particularly timely to consider this group because the last decade of change is in marked contrast to the growth and expansion of highway work in earlier years. Before entering upon an investigation of this period of change, therefore, it will perhaps be an advantage to consider the longer history of the object of their activity: the highway network. Associated with this brief historical review will be an account of the profession which, over the years, has developed the expertise and occupational discipline to claim the prerogative of maintaining and enhancing the highway system. Finally, to establish the organisational background of the study, the development of highway management in Kent will be described.

1.3. HISTORICAL CONTEXT

1.3.1. The development of the highway system and its management

Archaeologists have found remains of paved roads in Crete constructed in the second millennium B.C. (Sprague de Camp 1977 p.84) but the earliest paved roads found in England are Roman. Prior to the invasion in 43 A.D. long distance communication was by ridgeways and trackways which were little more than the customary paths marked out by the frequent passing of man (Addison 1980 p.14 et seq.).

As the Romans advanced across England, they built roads, however rudimentary, to connect their forces to their operational bases. Over time these became reconstructed as permanent, all-weather, paved roads. Generally they had three elements in common: the road surface, or metalling (up to 30 feet wide), an embankment raising the surface up to 6 feet above ground level and two side ditches. The characteristic feature of these roads was their directness, minimising both the distance between stations and the risk of ambush (Johnston 1978).

These roads were so well built that they remained in use long after the Romans left in 409 A.D., and were such a marked feature of the landscape that they later became adopted as parish and even county boundaries, in the same way as natural features. Indeed, the Roman system essentially forms the basis of the present road network.

During the middle ages great lengths of the paved Roman highways disintegrated and disappeared. The bulk of goods were carried by unshod pack horses and plain earth tracks were adequate except in heavy rain. Road maintenance was a work of piety rather than a public duty, and the Church played a large part in bridge and road work. With the dissolution of the monasteries in the sixteenth century this work generally ceased. As a result conditions on the roads became so intolerable that parliament was compelled to assume responsibility for "amending of highways being now very noisome and tedious to travel in and dangerous to all passengers and carriages". It did so by passing the 1555 Act (2) which remained in force for nearly 300 years. Parishes were made responsible for the upkeep of main roads leading to market towns which lay within the parish. The parishioners were to elect highway surveyors to supervise work on the highways and on four specially appointed days in the year those holding land in the parish were to provide carts with two men for work on the highway, while other householders were to give their own labour.

The statute labour system had many weaknesses. Parishes lacked the resources to keep roads in a good state of repair, highway surveyors lacked knowledge and authority, and individuals lacked the incentive to carry out their obligations conscientiously. In 1563 the number of days required was increased to six, but the system of statute labour was never fully successful (Albert 1972). The inadequacy of the parochial system became increasingly serious with the growth of wheeled

traffic in the 17th century, particularly after the "glorious revolution" in 1688. Powers to levy a rate in lieu of statute labour were granted in 1695 (3) but still the resources available proved inadequate to meet the need. A new system was essential.

The system adopted, towards the end of the 17th century, became known as the "turnpike" system. By act of parliament a group of individuals, usually local landowners, were entrusted with the construction and maintenance of a length of road, and were authorised to charge a toll for its use. The first turnpike act, passed in 1663 (4) was a temporary measure designed to provide funds to supplement statute labour on a section of the Great North Road. Thirty two years were to elapse before the passage of the second act (5) but then interest began to increase. In the 56 years after 1663, 37 turnpike acts were passed. In the next 52 years, 498 acts became law. By the end of the turnpike era, in the early 19th century, 912 acts had been passed (Albert 1972, p.45) and nearly 20,000 miles of main road were controlled in this way. As a result a marked improvement in the highway system was brought about, particularly in the second half of the 18th century. Roads were reconstructed, many on the Macadam principle (Rogers 1961, p.32), hazardous bends and unnecessary detours bypassed and a comprehensive, reliable coaching system became practicable. These changes, together with new roads provided by landowners to facilitate enclosures, brought about the first major changes to the highway network since the middle ages. The system created remains the basis of the present network, apart from new routes built in the last 25 years.

But the new found excellence of the English highway system was not to last for long. The opening of the Stockton and Darlington railway in 1825 marked the beginning of a new era in transportation and as the

new railway lines spread, so the coach and freight traffic on the turnpikes died away - and with it the toll income. As a consequence the road systems fell into decay and the turnpike trusts were wound up. 108 around London were abolished in 1864 in a single operation and the last was dissolved in 1895. (Wilkinson 1934 p.175 et seq). Their responsibilities were progressively transferred to Highway Boards during this period. These were virtually the same bodies as those for poor law and sanitation. These in turn had originated from the work of the Poor Law Commission in 1834, which established groupings of parishes into Unions for the administration of workhouses and poor relief, and the Public Health Act of 1848, which led to the establishment of Boards of Health. The Boards of Health and Highways were the predecessors of the Rural and District Councils established in 1894. In addition to these Councils old established towns were already (by Royal Charter) municipal boroughs and responsible for roads within their boundaries. Main roads, however, were made the responsibility of the County Councils, created in 1888.

Traffic on the deserted and derelict main roads began to build up again at this time - first with the great popularity of cycling, especially after the introduction of the "safety" bicycle in 1888, and increasingly from 1900 with the beginning of the motoring era. By 1914 commercial motor vehicles were better developed and more widely used in this country than any other. The roads of the south east were particularly heavily trafficked during the 1914-18 war and special grants were made after the war to repair some of the damage. The growth in all forms of motorised traffic continued. By now it had become necessary to bind the surface of the road with tar or bitumen to mitigate the dust problem caused by rubber tyres on the old water-bound stone surfaces. In 1920 grants began to be made from the Road Fund

(the product of the special taxation of road vehicles) towards the cost of maintenance of main roads, and six years later the concession was extended to minor roads.

Extensive new road construction took place on the main roads out of London to assist in unemployment relief and in 1936 the main roads were "nationalised" by their classification as Trunk Roads under the direct control of the Ministry of Transport. Some by-passes and new "arterial roads" were created at this time, with increasing use of mechanical plant, but the programme was cut short by the outbreak of the 1939-45 war. Road building resources were put into the construction of airfields and military installations, and expenditure on maintenance was minimised. The lack of proper maintenance, coupled with intense military traffic, left the country's roads in a very battered condition at the war's end. Initially highway authorities were recommended by the government to set their spending at 150% of the average of the three pre-war years (Williams 1980) but the intense winter of 1947 and successive financial crises frustrated this policy. When the financial situation eased in the early 1950's extensive maintenance works commenced, making increasing use of mechanisation. The number of registered vehicles in the country doubled between 1945 and 1950, doubled again by 1960 and doubled yet again by 1978 (Cox 1980). Faced with this massive increase in motor traffic, particularly of heavy vehicles, maintenance activities had become increasingly sophisticated and the 1970's saw the introduction of nationally accepted highway assessment systems to promote objective and economic maintenance of the highway asset.

From the introduction of the country's first traffic signals in 1930, traffic management systems, and transport planning techniques have developed dramatically, particularly with the introduction of

computer processing of data and control sequences in the 1960's. These endeavours to obtain maximum capacity from the existing network were matched by a steadily growing programme of motorway construction, commencing with Preston Bypass opened in 1958 and the first 73 miles of the M1 opened in 1959. In 1961 122 miles were open to traffic and 120 miles were under construction. By 1971, 676 miles were open and a further 282 miles were under construction. Expenditure on construction and improvements on motorways and trunk roads more than trebled in real terms during this decade. Although this programme had at first been generally welcomed and in spite of efforts to encourage public participation in road planning, there was growing, and at times, militant, opposition to motorways in the early 1970's. This, combined with the deteriorating financial situation and the oil crisis of 1973, began to constrain the motorway programme which had passed its peak by 1974.

The management of the highway network had also gone through a period of change. Rural District Councils had lost their highway powers in 1929 and the Ministry of Transport's increased activity on trunk roads from 1936 has already been referred to. In 1967/68 the Department of the Environment set up the Road Construction Units (R.C.U.'s) to speed up the motorway programme. These were a unique combination of national and local government staff, with county employees seconded to the R.C.U.'s to join Department engineers and administrators in a single special purpose organisation. The Local Government Act of 1972 made County Councils the single highway authority for all roads other than trunk roads, though the newly created District Councils were enabled to seek agency arrangements with their County authorities to carry out some highway tasks. The Local Government Planning and Land Act of 1980 placed constraints on the

operations of Direct Labour organisations which, up to then, had provided the main resource for highway maintenance, while, in the same year, the R.C.U. organisation was dismantled and the majority of work put to the private sector.

Thus the past decade has been a time of considerable change for highway engineers. Economic, technical, organisational and political changes have followed each other in quick succession influencing the professional's chosen field of knowledge, his achievements, his autonomy, and his social credibility. It is for this reason that these professionals and their organisations are felt to justify investigation. But it is first necessary to describe the development and scope of highway engineering as a profession.

1.3.2. The development of a profession

It must first be said that there is not a distinct profession of highway engineering. Those responsible for the management, maintenance and enhancement of the highway network are professional civil engineers, who specialise in highway or bridge design and construction. They have a long pedigree. In Roman times the road surveyors were a distinct body of experts, the gromatici, subjected to a vigorous professional training (often in the army), equipped with accurate instruments and working to a high standard with tried and tested techniques (Johnston 1978).

The highway surveyors elected in accordance with the 1555 Act had no such pretensions of professional competence. They had no training for their task, only served for one year, and had little or no influence over their neighbours. The Sevenoaks Petty Sessions minute for 22nd January 1709 noted that one reason for the poor state of repair of highways was that "men of small ability, and little or no

respect or authority in their respective parishes and liberties have ... been admitted and appointed surveyors". (Melling 1959).

The surveyors appointed to the early turnpike trusts were little improvement on their predecessors in the parishes. James McAdam's list of those who had served before him on six trusts to which he was general surveyor were fairly typical. They included a Lloyd's coffee house underwriter, many "old infirm men", a carpenter, a coal merchant, a baker and a publican. (Albert 1972, p.29). Nonetheless, in the second half of the 18th century, a new type of surveyor appeared to meet the growing demand for skilled supervision and dedication to the task. Among these was blind John Metcalfe, who adopted the form of carriageway construction developed by a Frenchman, Pierre Tresuguet, in building nearly 200 miles of turnpike in Yorkshire. His methods were adopted by Thomas Telford who was responsible for the coachroad from Perth to Inverness in 1806, and who later went on to build many miles of road in England and Wales. The greatest road builder of the era was, however, John Loudon Macadam. By 1837 he and his two sons were employed by 58 turnpike trusts and hundreds of miles of road had been "macadamised" - a sandwich of graded stone with a finer grade wearing surface rolled and cemented in its own powderings.

At this time the French were the leading authorities in engineering theory. Smeaton, Telford and Rennie, prominent engineers of their day in this country, all learnt the language to be able to read French text books. They would, after the French example, have called themselves civil engineers, in order to distinguish their activities from military engineering. John Smeaton was said to be the first engineer in Britain to use the term (Hartley 1968). Without technical colleges and with few text books, the only way for a young man to learn his craft was by apprenticeship and shared experience.

Some formal venue for the exchange of practical knowledge and to give the growing profession identity and status now became essential (6). In 1818 H.R. Palmer, an engineer of 22 who had worked with Telford, and a group of his friends formed the Institution of Civil Engineers "for facilitating the acquirement of knowledge necessary in their profession". Telford became the first President in 1820 after some hesitation, but once committed he threw all his energies into increasing the new Institution's scope and power. A Royal Charter was granted by George IV on 3rd June 1828, in which the aims of the Institution were stated to be "The general advancement of mechanical science and more particularly for promoting the acquisition of that species of knowledge which constitutes the profession of a Civil Engineer being the art of directing the great sources of power in nature for the use and convenience of man". Clearly both the safeguarding of a basic body of knowledge and the ideal of service were present in the initial concept of the Institution. At an early stage too there was control over membership, though examinations for corporate Membership were not introduced until 1897. By that time, however, there had begun a process of disintegration into sub-associations covering specialised fields.

The Institution of Mechanical Engineers was formed in 1847. In 1873 an Association of Municipal and Sanitary Engineers and Surveyors was formed within the Institution of Civil Engineers ostensibly to ensure the autonomy of engineers and surveyors in carrying out their duties "according to principle and not policy" (7). It became the independent Institution of Municipal and County Engineers in 1908. A Royal Charter was granted in 1948 (when the name was changed to "The Institution of Municipal Engineers") with the object of "the promotion of the science of engineering and cognate subjects as applied to all or

any of the duties imposed upon or service undertaken by local authorities and other public undertakings for the benefit of the community with the object of securing the highest degree of efficiency in the discharge of such duties".

With the growth and increasing sophistication of highway work in the country between the two world wars it was almost inevitable that a specialist institution should be formed for highway engineers. As early as 1925 Captain Charles Frobisher, the then surveyor to Dereham Urban District Council, was canvassing his view among professional colleagues in East Anglia that highway engineers were poorly served by existing professional bodies. The Institution of Highway Engineers grew out of the series of informal gatherings which followed Frobisher's initiative. It was incorporated on 30th December 1930 "to promote the consideration and discussion of all questions affecting the profession of Highway Engineering and branches of Engineering allied thereto to promote economy, efficiency, excellence and cooperation in such profession or branches, and generally to watch over, support and protect the character, status and interest of Highway Engineers". (Thompson 1980, p. 53). Its growth matched the growth of road programmes and public interest in highway matters - hesitant until 1950, when the membership first passed 1000, and then gathering momentum during the next decade to a peak of success during 1960-70. Its strength has always been in the activities of its local branches. Although its objects of association state most clearly the intention of protecting professional autonomy the Institution has never obtained a Royal Charter, has admitted non-professionals from commercial undertakings as members and relies on success in the examinations of such bodies as the Institutions of Civil and Municipal Engineers as the route to membership.

It established a Diploma in Traffic Engineering in 1960 which helped to clarify its role as a specialist Institution, but the original claim to there being a specific profession of highway engineering remains equivocal without the seal of a Royal Charter. The learned society role is unchallengeable. The credibility of the commitment and public service role is constrained by the association of members with commercial activities. Professional autonomy and self-regulation has always been restricted owing to the dependence on other Institutions' examinations for qualification and the high proportion of members who are employed in bureaucracies.

The Institution of Civil Engineers remains the premier institution for static works (at the time of writing the Municipal Engineers are about to re-amalgamate with the Civil Engineers). The difficulty for a more specialist organisation remains the rate of development in its specialism. In highway engineering the emphasis has changed from the physical activities of design, maintenance and new construction to the advanced systematic analysis and control of traffic, the economic assessment of maintenance needs and priorities, and the wider transportation issues. In 1983 the Institution of Highway Engineers changed its name to the Institution of Highways and Transportation to reflect this change in emphasis. Whether this will strengthen or weaken its representative role and its appeal to engineers working in the field remains to be seen but it symbolises the technical change experienced by highway engineers in recent years. Those employed by highway authorities have, in addition, experienced political and organisational changes.

1.3.3. The development of highway management in Kent

Because of its geographical location, highways in Kent have always had strategic, in addition to local significance. When the Romans landed in Britain in 43 A.D., they made their bridgehead at Richborough on the east Kent coast. They advanced to London along the line which became Watling Street and which is now the A.2 London-Dover trunk road. Further south, on the wealden clays, the dense forests provided timber for houses, ships and later iron. To reach these resources secondary routes ran north-south from Watling Street to the weald. With the increase in traffic from the middle ages onwards another east-west route developed. This ran directly along the sand outcrop at the foot of the north downs. Today the A.20 London-Folkestone trunk road follows close to this route.

By the 18th century the roads of Kent had a mixed reputation. Those on chalky or gravelly soils were useable in all but the worst weather but those on the heavy wealden and gault clays were bad at most times and virtually impassable in winter (Jessup 1966, p.48). This varied geology tended to reinforce the variability in road conditions which was inherent in the statute labour system. In the 18th and 19th centuries there were some 400 autonomous parish highway authorities in the county. With its proximity to London it was to be expected that some of the earliest roads to be turnpiked, in an endeavour to obtain better and more consistent standards for through traffic, would be in Kent. The first was the highway from Sevenoaks, through Pembury, to Tunbridge Wells in 1709 (8) followed by the Gravesend to Rochester road in 1711 (9), the journey from London to Gravesend generally being made by boat. By the first half of the nineteenth century 40 of these trusts were active bringing the total number of highway authorities to nearly 450.

With the coming of the railways the majority of major routes were "dis-turnpiked" in the second half of the 19th century, passing first to highway boards and then to the new County Council (in 1888), while other roads passed from the parishes to the new urban and rural authorities in 1894. Thus, by 1900, the management of highways in the county had transferred from 450 authorities to 62: 1 county, 37 urban districts and boroughs, 1 county borough, and 23 rural districts. There was an increase of one in 1936 when the Ministry of Transport took over trunk roads, but a decrease to 40 in 1946 when the county ended delegation to rural districts and a further decrease to 30 in 1965 with the transfer of boroughs on the fringes of London to become the new boroughs of Bromley and Bexley in the Greater London area.

Thus by the early 1970's there were 30 separate organisations in Kent, loosely coordinated by the county council, carrying out highway maintenance and improvement works. The 1972 Local Government Act reduced this number to one, the county council being made highway authority for all roads in the county, other than trunk roads, for which it had agency responsibility to the Department of Transport. As a result of negotiation between the shadow county council and the 14 shadow district councils in the year preceding the Act being implemented in 1974, all districts in the county were granted agency arrangements to carry out highway activities in all or part of their district. This was, however, to be under the guidance and authority of the county council; and progressively over the next decade district engineers have had to come to terms with this loss of autonomy. During this time also finance available for roads has decreased while traffic has increased. There have also been significant political developments. Locally relations of professional officers with their elected members have changed. There has been greater involvement by

committee members and in particular by committee chairmen and the majority party leader in the day-to-day administration of departments. On this national scale central government, focussing national economic and social concerns, has initiated legislation, commissioned reports and issued directives which have had a profound influence on the structures and processes within and between the county and district organisations responsible for the highway tasks (see Chapter 4). Individual reactions to the changed relationships, activities and influences which have resulted are the subject of this study.

1.4. SCOPE OF THE STUDY

Compared with the long history of highways and their management, the past decade is a relatively brief interlude. The changes in that time have, however, been significant. In retrospect, reorganisation of local government in 1974 appears to have marked the end, rather than the beginning, of an era of optimism. Whilst the load of traffic on highways has grown dramatically, the resources to maintain and enhance the asset of the road network have decreased. While road building programmes have been curtailed, public questioning of the need for new roads has increased. While engineers' opportunities for achieving completed projects have diminished, the involvement of politicians in the management of their departments has expanded. Autonomy of line managers has become constrained while the specialist support groups have proliferated.

For the individual highway engineer, the impact of these changes has been to alter work expectancies, and to widen and diversify the network of other individuals and groups with whom he is interdependent. Some find this widening and diffusion of responsibility both stimulating and satisfying. Others find it frustrating. It is this

rich interplay of satisfaction, relationships, and technical endeavour that makes the, quite limited, world of highway engineers in local government potentially of more general interest. This study is an account of the process of exploration, conceptualisation, application, and consolidation which led to a greater understanding of the outcome of these events and experiences.

1.4.1. Exploration (Chapter 2)

To understand the consequences of environmental changes for individuals employed in highway activities we will be seeking a framework which is consistent and integrative. To draw a comparison from the engineers own discipline, structural design philosophy provides an explanation for the behaviour not only of an individual element of material, but also of a unit made up of those elements, and of a structure made up of those units under changing exterior load conditions. So too the writer hoped to find a consistent framework which would explain the decisions and activity of an individual member of an organisation, of the colleagues with whom he interacts, of the organisation made up of those members, and of the organisation in reaction with its environment, as successive intergrations of individual elements of activity. One might liken this to taking a single line of sight on an organisation, but adjusting the depth of focus to give different planes of vision. The single line of sight will give consistency, the differing foci will give comprehensiveness (10).

When one turns to the literature for guidance one finds a plethora of viewpoints, and a range of planes of vision - from individual decision making to inter-organisational processes. Anthropologists, sociologists, economists, psychologists, and social psychologists have

described organisations and their members from differing viewpoints. Each has imposed his own system of rationality on decisions and actions. Behaviour which is rational to one is deviant to another (Perrow 1980). An inter-disciplinary approach, with multiple systems of rationality is required to integrate the varying viewpoints.

In Chapter 2 this range of writers' viewpoints and concepts will be examined. Because we are particularly concerned with the actions and reactions of individuals, the varying accounts of motivation and behaviour will be of particular interest. So too will organisational theory, reflecting as it does equally varied approaches to the problem of effectively integrating and motivating individuals' activity for organisational ends. Because highway organisations have functioned in a rapidly changing environment we will also wish to examine the contingent relationships between organisation and environment described in contingency theory.

But for highway authorities, much of the influence of the environment is crystallised through the legislation and directives of another organisation: the Department of Transport. Inter-organisational network concepts will therefore be relevant, whilst the focus of this research on relationships within organisations will require attention to be paid to intra-organisational networks also. Finally, reference must be made to the somewhat diffuse literature on organisational change and to those descriptions of policy implementation (11) which are concerned with the process of implementation within organisations.

1.4.2. Conceptualisation (Chapter 3)

It has already been indicated that we wish to develop a comprehensive framework from the review in Chapter 2 within which to

structure, categorise and comprehend the changes in relationships, reactions and responsibilities in highway organisations in Kent over the last decade. Other writers have developed concepts from philosophical or sociological viewpoints. As a result they may be somewhat abstract for practising managers or other employers in commercial or administrative organisations. By contrast the writer brings an engineer's perception to the subject, and it is, perhaps, as a result that in Chapter 3, a three dimensional model of individual activity is developed - of needs delineated by vectors, and goals as resultants. Certainly there is a structural analogy in the picture presented of organisations as multiple-networks with individuals as nodes, and their relationships with others as links between those nodes. These networks extend out into the organisation's environment to link individuals in the intra-authority network with significant representatives or groups in the inter-authority network. This is compatible with the study's "bottom-up" viewpoint of organisations as groups of individuals in purposive activity (in comparison with the more deterministic view of organisational activity as being in response to environmental prerequisites). The network concept (of which the individual is the basic element) gives consistency to this conceptualisation; the ability to change the plane of focus from individual nodes, to linked nodes, to organisations as a network of links, and to the environment as organisations and individuals linked to the focal organisation, will give comprehensiveness. So too will the recognition that technical, economic, authority and social influences all play a part in influencing the activity of organisational members. The value of these concepts must then be tested by application to actual events and experiences.

1.4.3. Application (Chapters 4, 5 and 6)

In Chapter 4 changes in the economic, technical, political and social environment of highway authorities and their members will be examined and categorised within the framework developed in Chapter 3. The principal role played by the Department of Transport will be identified, and the extent and location of the impact on the highway organisations determined. Chapter 5 will describe the organisational changes which have occurred in Kent in response to these external (and associated internal) pressures. This will also provide an opportunity to describe the organisational structure in which individual highway engineers operate in the county. The organisational changes will be categorised and conceptualised in accordance with the models developed in Chapter 3, and will set a framework within which individual experiences and linkages can be analysed.

Chapter 6 will be a report of the responses of a sample of highway engineers, and others involved in their work, to questions regarding their impressions of the nature and influence of change in their professional activities and relationships over the last decade. The method of enquiry is by questionnaire and personal interview. Those interviewed include officers of both County and District authorities, and elected members of those authorities. In themselves the responses will give subjectivity to the title "highway engineer" and emphasise the differences in perceptions and priorities among the differentiated sections and specialisms within the professional group. At a more abstract level, the morphology of the technical, authority, and social networks will be delineated.

1.4.4. Consolidation (Chapter 7)

Consolidation marks the end of one study and hopefully the commencement of a fresh cycle of understanding. Concepts will be restated in the light of their application to actual events, particular themes of the study will be reiterated, and some consideration given to the extent to which the framework developed might be of assistance in extending motivational and organisational theory, and in particular the present concepts of organisational change.

Throughout the study an attempt will be made to balance abstraction with the reality of personal experience. Perceptions of and reactions to the last decade of change may be set in abstract terms such as roles, relationships and networks. This should not obscure the fact that the reality of highway work is set in bright-lit offices, wind-swept highways, and the deep mud of construction sites. Rhodes concluded his study of inter-governmental relations:- "... part of the challenge in the study of inter-governmental relations in Britain is to confront theories with the 'reality' as defined by the participants and their behaviour. Certainly virgin territory awaits those willing to explore" (1980, p. 315). The challenge is the same for this study of inter-personal relations of engineers in a changing environment - to confront abstract concepts with the 'reality' of individuals' perceptions and experiences. A central question will be the extent to which changing environments have limited the perceived autonomy of highway engineers and threatened their motivation. In the next chapter other writers' conceptual maps will be employed to explore well trodden motivational and organisational territory.

Notes to Chapter 1

1. The term "professional" is used colloquially at this stage. Highway engineers exhibit the characteristics of professionals in that they have a basic body of abstract knowledge, strong commitment to their task and a measure of control over their occupational group (see for instance Etzioni 1969 and Johnson 1972). However they have, to some extent, lost the cohesion and autonomy which typified the traditional professions. In these circumstances Etzioni might categorise them as "semi-professionals". See also Chapter 3 for an extended consideration of professional actions and reactions.
2. 2 & 3 Ph. & M. C.8
3. 3 Wm & Mary C.12
4. 15 Car II C.1
5. 7 & 8 Wm.III C.9
6. This summary is derived from the history of the Institution of Civil Engineers published in its current list of Members.
7. This summary is derived from the history of the Institution of Municipal Engineers published in its List of Members.
8. 8 Anne C.20
9. 10 Anne C.16.
10. The approach here is somewhat different from Allison (1971). He used three different "conceptual lenses" to analyse the Cuban missile crisis. In his case both the viewpoint and the depth of focus change for each of the three concepts.
11. In the last decade a number of studies of the organisational activities between policy decisions and outcomes have appeared. Their concern with the dynamics of implementation processes within organisations (see e.g. Dunsire 1978) is particularly relevant to this study of individuals "implementing change".

CHAPTER 2

UNDERSTANDING ORGANISATIONS AND THEIR MEMBERS

2.1. INTRODUCTION

What do we mean by "organisations"? Schein initially defined organisation as "the planned coordination of the activities of a number of people for the achievement of some common explicit purpose or goal through the division of labour and functions, and through a hierarchy of authority and responsibility" (1980, p.15). Later in his book he extends this to embrace "a view of organisations as open, complex systems in dynamic interaction with multiple environments" (1980, p.220). The first definition is compatible with what might be termed a formal or classical view of organisations (see below), and with formal statements of objectives, organisation charts and job descriptions. The second definition conveys a more complex view of the physiology and dynamics of organisation life, shading into what could be termed a systems perspective (see for example Silverman 1970, Ch. 2).

A third view of organisations concentrates on relationships and behaviour within organisations. This Action approach (Silverman 1970, Ch. 6 and 7) offers a means of analysis of organisations rather than a theory of organisations per se. Together these three perspectives reflect the changing focus sought in this study: of individuals; of the organisation; and of the organisation in its environment.

All three planes of focus will be relevant to our studies of highway organisations in a time of change. For example, it will be recalled from the last chapter that the 1972 Local Government Act was a potent source of change for many of those employed in highway organisations. But the one source of change influenced individuals at different levels. Thus engineers in District authorities had to adjust

first to a regrouping of authorities and a loss of autonomy in highway matters, with significant dependence on County Councils for their highway work. Then they had to adjust to the subsequent reorganisation and regrouping within the new authorities. And finally they had to adjust to new relationships with County engineers, and to their values when reaching decisions in highway matters. In exploring other writers' views on the working of organisations we shall, therefore, be seeking a consistent framework to consider interactions and reactions at the inter-organisational, organisational and individual level (1).

Since the focus of change is the individual, whatever his position in the organisation, we must start the exploration with a consideration of the factors determining individual action, before moving on to consider the results of re-action with others in organisations. We will assume action to be purposeful; that is to have both a motive and a goal (2). Simon defined goals as "value premises that can serve as inputs to decisions", and motives as "the causes, whatever they are, that lead individuals to select some goals rather than others as premises for their decisions" (1964, p.3). Decisions result in, or influence, actions. The same action may have a range of goals. Simon quotes the story of three bricklayers who were asked what they were doing. "Laying bricks", said one, "Building a wall", said another, "Helping to erect a great cathedral", replied the third. The goals were different, though inter-related. Doubtless their motives were equally varied. In considering why individuals act as they do writers have assigned to them a multiplicity of motives. It will be necessary to consider, first, this range of motives, and then what inter-relationship there may be among them.

Individuals are generally constrained in the actions they take in organisations (3). The organisation facilitates the realisation of some of their personal goals (wealth, security, self-respect) in exchange for activity which contributes to the achievement of organisational goals (or at least the goals of those who control such organisations). Therefore, to expand understanding of the influences affecting individual activity we must move on to consider how that activity is integrated by the organisation.

The individuals who form the subject of this study are, for the most part, professional engineers and might therefore be taken to be self-motivating. However, they are employed by quite rigidly structured bureaucracies with established procedures and "standing orders". Furthermore their own professional motives may conflict with the politically determined goals of their organisation. The means adopted by senior management to coordinate and direct their activities must therefore take account of personal objectives. We will find that writers' views on the working of organisations accordingly reflect as wide a range of approaches as those adopted in the explanations of individual behaviour.

The third level of analysis relates to the organisation in its environment. A number of writers have sought a contingent link between the characteristics of an organisation's environment and its internal structure, its members attitudes, and its effectiveness. They reflect the systems view of organisations referred to above. Because highway organisations have been strongly influenced by their economic, social and authority environments in the last decade we will wish to explore this contingency approach to organisations (see for example Lawrence and Lorsch 1967).

The contingency approach may be found to adopt rather an abstract view of the environment. For highway organisations many of the influences for change are crystallised through other authorities. Just as the organisation is made up of individuals, so the environment consists of other individuals and organisations (see for example Emery and Trist 1960, Aldrich, 1979). These are interlinked with the focal organisation. If this is the case then a network analogy would appear to be relevant to the wider view of the system in which the organisation has its existence (4). To provide an integrative framework the network must extend out to significant individuals, groups and organisations in the focal organisation's environment, and also down into that organisation to individuals in purposeful activity.

From Simon's definition above, activity, stemming from decisions, must be intermediate between an individual's motives and achievement of his goals - it is a means towards valued ends. Similarly at the organisation level, "implementation" is intermediate between policy and organisational goals (5). Because writers on implementation in the context of policy analysis use concepts from the organisational literature in their analysis (see for example Elmore 1978 and Dunsire 1978), there are aspects of their writings which are relevant to our understanding of activity in organisations over time. Similarly writers on the impact of change in organisations over time (see for instance Gross et al 1971 and Kaufmann 1971) provide insights which are valuable in this respect.

In reviewing this wide ranging literature the emphasis will be on the individual as the basic "unit of analysis". The study stems from personal experience, and its most productive field of research will be into the personal relationships, experience and reactions of individual engineers. This concentration on the individual will ensure

consistency whilst undertaking a comprehensive exploration of other writers' concepts of individual, organisational and inter-organisational activity.

This is a wide field and the review is inevitably cursory. In particular, other writers' criticisms of particular concepts are not dealt with at length. The review starts from the assumption that no one viewpoint will have a monopoly on truth, and that a multi-disciplinary approach is required. In section 2.2 below writers' concepts of individual motivation are considered, and in section 2.3 similar concepts are explored in relation to organisations and their members. Economists, sociologists and psychologists contribute to the complex picture which emerges. In section 2.4 there is another change of focus to consider the organisation in its environment and in section 2.5 network concepts are explored as a means of providing a structure to inter- and intra- organisational relationships. Finally in section 2.6 the dynamics of change and implementation are considered, having regard to the activity of many of the individuals in the organisations under review who may legitimately be considered to have been "implementing change". This is the "territory" which the writer has explored in his search for a consistent and comprehensive framework for the analysis of experiences of, and reactions to, change in highway authorities over the last decade.

2.2. INDIVIDUAL MOTIVES

The premise for this study is that it is reasonable to assume that the larger proportion of activity is purposive, and that the decisions which initiate it are motivated and rational (6). We have seen above that Simon defined motives as the causes leading individuals to select some goals rather than others as premises for their decisions (and

hence their ensuing actions). Clearly man has a variety of motives and different writers have suggested differing motives as having dominant influence on activity in organisations. Some identify economic motives, some social motives, some higher motives for achievement and self realisation, and some a complex pattern of motives acting concurrently. The first two are matters of personal experience (and are accordingly only referred to briefly below). The third might be anticipated to have particular relevance to a group of professionals such as those in this study who are concerned with the achievement of specific end products. It is the interplay of the three which is critical to our understanding of the impact of change on motivated individuals.

2.2.1. Economic Motives

The view that man is primarily motivated by economic needs and hence tends to maximise his economic reward, emerged among managers and writers in the early years of this century. They reflect what is basically a hedonistic assumption that man is motivated to maximise his self interest. The economic view prompted Taylor (1911) in his pursuit of "scientific management". Taylor's belief was that, for every activity in industry, there was "one best way". Having found that way by observation and experiment, managers were in a position to set a standard time for that operation. To motivate the worker to achieve and maintain the standard Taylor recommended the construction of a proper wage incentive system, so that both employer and employee would share in the economic gain of increased productivity.

Taylor's perspective and its heritage have been attacked by a number of writers from a variety of perspectives (see for example Braverman 1974, Mouzelis 1975 and Rose 1978). Mouzelis, for example,

sums up the criticism of Taylor's machine approach "The organisation member was conceived as an instrument of production which can be handled as easily as any other tool (provided one knows the laws of scientific management). In such a conception there is no consideration of the feelings, attitudes and private goals of the individuals Taylor neglected the psychological and sociological variables of organisational behaviour" (1975 p.85) (emphasis added).

The relative success of Taylor's methods, which remain the foundation for work study practice and associated incentive schemes to the present day, indicate that economic gain is often perceived as a major motivator for certain types of work. However this perception can be self-fulfilling. Emphasis on financial inducements has led employees to seek additional financial rewards, particularly when industrial development resulted in more skill and initiative being required of them (7). Also financial inducements do not necessarily only satisfy economic needs. From one's own experience, the economic motive is not simple. Financial rewards are both instrumental to the realisation of security and economic goals, and a surrogate for esteem, power and achievement goals. The quest for economic gain can hide a multitude of goals.

However the model of economic man, or at least of man as a self-interested maximiser, has other important applications, in particular in the economist's model of the rational decision maker described by March and Simon (1958). If Von Mises is correct, rationality and the economic motive are inextricably linked: "the economic principle is the fundamental principle of all rational action, and not just a particular feature of a certain kind of rational action... All rational action is therefore an act of economising" (1960, p. 148). This is reflected in Down's (1967) view of the bureaucrat "maximising utility".

He pictures the individual developing a level of satisfactory performance at which he feels he is maximising utility in the light of his existing knowledge. If he perceives a gap between his actual gain and a satisfactory level he will intensify his normal level of routine search to find opportunities to improve his situation.

Thus economic motives can influence action in self interest and in the interest of the organisation. But emphasis on this motive alone showed that other factors were also influencing individual decisions.

2.2.2. Social Motives

Early attempts to put the mechanistic principles of scientific management into practice met with a hostile reaction from workers (Friedman 1955). In an endeavour to overcome this resistance, tests were devised to select the best man for the job and to determine how far his performance would be affected by temperature, lighting, humidity and noise in the workshop (Brown 1962). Experiments of this nature at Western Electric's plant at Hawthorn, Illinois, in the late 1920's and early 1930's drew attention dramatically to the fact that social need and in particular the need to be accepted by one's fellow workers can be more important than the economic incentives offered by management. These studies (Roethlisberger and Dickson 1939) marked a transition from a preoccupation with economic motives to an investigation of social motivation. Scientific management sought to determine how scientifically measured activities could best be fitted together to build an efficient system. Attention now turned to encouraging individuals to work together.

Following the Hawthorne investigations the recognition that workers bring to the organisation social needs that find expression in informal groupings led to a new set of assumptions about human nature.

Elton Mayo (1945) suggested that social needs were the prime motivation of human behaviour and that interpersonal relationships were the prime shaper of a sense of identity. Criticism of this human relations school, exemplified by Mayo's work, has centred on its blinkered "pro-management" bias. Management is seen as rational, the workers as irrational. Conflict is considered to reflect a negative attitude; cooperation must be on management's terms (Landsberger 1958). However "it must not be assumed ... that the Hawthorne studies are not significant. They are important because they initiated a whole new line of research and ... revealed some neglected realities and factors in organisational life that significantly influence behaviour" (O'Shaughnessy 1976, p.108).

Subsequent research has indicated that the influence of social relations at work may not be as significant as Mayo and his colleagues anticipated (see for example Dubin 1965). However the difficulties which arise when social needs are not satisfied (for example, the lack of social exchange on the noisy production lines described by Walker and Guest 1952) are sufficient to indicate that social motives in addition to economic motives can figure in man's decision making.

2.2.3. Achievement Motives

Mayo's basic proposition that work had become meaningless led a number of students of organisations to direct their attention to the intrinsic nature of the work itself. Argyris (1957, 1964) argued that workers became alienated when their work did not permit them to grow and use their skills and capabilities to the full - to achieve "self actualisation". The term derives from the writing of Maslow (1954). He postulated a hierarchy of needs based on the precedence with which they have to be satisfied, namely:-

1. Physiological needs : i.e. food, water, sleep
2. Safety needs : i.e. security, health, safe environment
3. Belongingness and love needs : i.e. acceptance and affection
4. Esteem needs : i.e. prestige and self respect
5. Self actualisation needs : i.e. self fulfilment and personal growth.

Maslow argued that the lowest order need has to be satisfied first. As it approaches satisfaction, the next higher begins to dominate until that in turn is satisfied and so on until perhaps later in life, with belonging and esteem needs satisfied, the motive becomes one of self actualisation - the highest need. In later works Maslow amplifies his concept of self actualisation "For one thing it looks as if there was a single ultimate value for mankind, a far goal towards which all men strive. This is called variously by different authors self-actualisation, self-realisation, integration, psychological health, individuation, autonomy, creativity, productivity, but they all agree that this amounts to realising the potentialities of the person, that is to say, becoming fully human, everything that the person can become" (1959, p.123).

The clearest evidence for the self-actualisation assumption comes from studies of professionals and managers for whom challenge and achievement might be anticipated to be important aspects of their work (Pelz and Andrews 1962). However satisfaction with less demanding work is not necessarily an argument against the reality of self-actualisation needs. If work is routine and unchallenging, workers may find fulfilment of higher order needs outside work (see for example Goldthorpe et al. 1968). Maslow's hierarchy of needs is more an exploratory model than an operational set. A variety of behaviour can stem from a single motive and may even conflict. It has proved

difficult to find empirical support for the hierarchy as Hall and Nougain (1965) show. Partly this stems from the difficulty of operationalising the categories. Partly it stems from the idiosyncrasy of human nature: for example, bravery in the course of duty (a higher order need) is in conflict with the more basic safety needs, while some voluntarily abjure economic well being.

Alderfer (1972) simplified the number of categories to three: existence needs (relating to Maslow's physiological and safety needs); relatedness needs (relating to Maslow's belongingness needs); and growth needs (equating to Maslow's esteem and self-actualisation needs). He does not postulate a fixed hierarchy or the successive emergence of needs and accepts that individuals will differ in the relative strength of the three needs. He concludes (1969) that empirical tests of his "E.R.G." (existence, relatedness, growth) theory tended to support it more than Maslow's hierarchy.

McClelland (1961 and 1976) identified three basic needs - the need for power, the need for affiliation and the need for achievement - in addition to economic needs (9). Common-place terms to express the spirit of all these needs categories might be to say that man appears to have needs in three principal sets or dimensions: economic needs, social needs and achievement needs (10). Whilst psychologists will inevitably identify a range of needs within these three broad categories, they have the advantage of being comprehensible to participants in organisations and relevant to those in managerial or technical tasks. But how is a balance struck between these, at times, competing needs?

2.2.4. Complex Motives

Lawless wrote "man the worker is both complex and variable. He has many motives. These are arranged in some order of importance for each man but any hierarchy of needs is subject to change, depending on the given circumstances" (1972, p. 160). If we group the varied categories of need identified by Maslow, Alderfer and McClelland into economic, social and achievement needs, we must accept that men must differ in the relative strength of the three needs though their actions are rational means of relieving these needs. Maslow considered that the progression from economic, through social, to achievement needs took place as each in turn was satisfied. Alderfer considered that there would be a similar progression from lower to higher needs with satisfaction but also showed that frustration of higher order needs could cause reversion to the lower categories. Herzberg (1968) considered two categories in relation to needs satisfaction: growth (achievement) and hygiene (economic) factors but he concluded that there was no interdependence between the two.

Herzberg first postulated his "two-factor motivation theory" as a result of a series of interviews with 200 engineers and accountants who were asked to describe in detail the occasions which had made them feel exceptionally good or particularly bad about their jobs. The findings, since corroborated by other similar investigations, were that factors involved in producing job satisfaction are separate and distinct from the factors that lead to job dissatisfaction. The growth factors producing job satisfaction were intrinsic to the job and included achievement, recognition, the work itself, responsibility and advancement. The "hygiene" factors, the source of job dissatisfaction, were extrinsic to the job and included company policy and administration, supervision, interpersonal relationships, working

conditions, salary and security. The interesting point deduced from the investigation was that the opposite of job satisfaction (as a result of growth factors) was not job dissatisfaction but lack of job satisfaction. The opposite of job dissatisfaction (as a result of hygiene factors) was not job satisfaction but lack of job dissatisfaction. Thus Herzberg concluded that the hygiene (economic) factors alone cannot promote job satisfaction. The two sets of factors are so separate that he asserts that it is as if they were on two different dimensions.

The theory has been strongly criticised. King (1970) points out that it has not been adequately tested in studies other than Herzberg-type critical incident studies and that consequently the theory may reflect the defensive biases of self report methods. House and Wigdor (1967) found that causes of job satisfaction varied from one person to another. The emphasis on achievement and esteem factors as contributors to job satisfaction is to be expected from professional respondents. Others, with more dominant economic needs might find job satisfaction in extrinsic job factors. But one can certainly say that, for the groups interviewed by Herzberg and his colleagues, satisfaction was related to the relief of achievement needs while dissatisfaction primarily stemmed from failure to meet economic needs. Herzberg's two-dimensional concept could be represented in graphical form by considering growth and hygiene needs to be expressed by two vectors. Since change in one was independent of change in the other, one might conceive the two needs vectors to be in two dimensions at right angles. And if needs are in two dimensions then motives must be in two dimensions also.

A similar graphical analogy is referred to, in passing, by Simon. He separates personal motives from organisational role-enacting

behaviour, leaving the decision to join the organisation as the only bridge between the two sets, and adds "to say that the abstraction is sometimes untenable is not to deny that there may be many situations in which it is highly useful. There are first of all, many organisational decisions that simply do not affect personal motivation at all - where organisational goals and personal goals are orthogonal so to speak" (1964, p.12) (emphasis added).

But we have identified three basic sets of needs: economic, social and achievement. If economic motives and achievement motives may be considered in two orthogonal axes, might not one add a third dimension for social motives? And if one conceives of motives in three dimensions then there must be a motive - activity - goal achievement sequences in three dimensions. If this action in each dimension is rational, this in turn would imply that there must be three types of rationality operating. Proponents of the economic/rational man view would only consider economic rationality. Simon sees the psychological and sociological factors which are central to the human relations viewpoint merely as constraints upon the individual's economic rationality. We would refer to them as being socially rational. In referring to organisational rationality Diesing, linking economic rationality with efficiency, writes "A rational organisation is an efficient one and other principles and modes of organisation are thought to be non-rational or irrational" (1962, p.1). However he proceeds to show that activities necessarily involve multiple types of rationality. We shall see in the next section that Hartwig (1978) uses Diesing's concepts to define five types and two levels of rationality for organisations. The types are technical, economic, legal, social and political rationality. For the individual, material (economic) needs will generate activity which is economically rational and social

activity will be socially rational. The individual must be able to order his economic, social and achievement needs preferentially and rationally, or find a resultant course of action which brings an acceptable measure of relief to all three (11).

This concept of multi-dimensional needs and systems of rationality has developed from Maslow's model of human personality. It is surprising that alternative models of personality have not received equal attention from organisational writers. Maddi (1968) groups them into conflict, fulfillment and consistency models. Freud's concept of individuals seeking to maximise instinctual gratification while minimising punishment and guilt is a picture of conflict within individuals. Murray and Kluckhohn (1956) develop this theme which in the context of this study might be taken to describe individuals striking a balance between the orthogonal economic (including survival) needs and social needs. Angyal (1952) and Bakan (1966) endowed the individual with higher order needs in a conflict model in which the core tendency is to maximise both the expression of autonomy and the expression of surrender and communion. These concurrent desires for differentiation and for integration could be interpreted as the individual seeking a balance between his social and achievement needs. Achievement motives and goals clearly include the need to stand alone and express one's uniqueness - or at a lower level, to do a (perceived) difficult task successfully and alone.

The conflict model of Angyal and Bakan is, therefore, compatible with fulfillment models of writers such as Maslow. Rogers (1959) pictures man as seeking to realise or actualise his inherent potentialities, balancing his need for positive regard by others against his need for positive self regard. This self concept - a conscious sense of one's own capabilities and personality - is another

element of the group of motives in the achievement axis. Again one can picture a balance being sought between social (integration) and achievement (differentiation) needs. Maslow (1954), Adler (1930) and White (1959) add substance to the self fulfillment, self-actualising concept. Maslow sees man's ultimate need as seeking the realisation of his inherent potentialities and cognitive understanding of himself. Adler sees man as striving towards superiority and perfection, whilst rather more prosaically White's core tendency is to seek a sense of competence. All these may be viewed as grouping around the inherently complex needs axis we have labelled achievement. To some extent, they represent a range of needs, values, and goals in a means-end chain leading to the ultimate goal of self-fulfillment. In that chain achievement holds a central position.

Consistency models are more concerned with individual equilibrium. Fiske and Maddi (1956) picture the individual's core tendency as an attempt to maintain the level of activation and stimulus to which he is accustomed and with which he is in equilibrium. Higher levels than customary lead to avoidance action, lower levels lead to search activity. This concept relates to activity rather than motives and goals and may assist in understanding the intensity of activity an individual indulges in whilst seeking a resolution of his economic, social and achievement needs.

The resultant of economic, social and achievement motives induces action. The manner in which a person determines which action has most value to him and the force on him to take that action is discussed by writers on "expectancy theory". This is based on the idea that the strength of a tendency to act in a certain way depends on the strength of the expectancy that the act will be followed by a given consequence (or outcome) and on the value or attractiveness of that consequence.

Vroom (1964) gave mathematical expression to this theory, and the relevance of his formulation to a three dimensional motivational model and activity in organisations is discussed at length in Chapter 3.

If all activity is motivated, and hence goal directed, and the outcome of an action is a means of achieving a goal we can liken activity to a link in a means-end chain of action and outcome. Each link is a means to an end which is itself a means to a higher goal and so on by a direct or indirect path to a goal which relieves the individual's basic three dimensional set of needs. Expectancy theory may therefore be linked into motivational theory to explain the "mechanics" of the means-ends decisions taken by individuals. It would appear to afford an opportunity to bring greater clarity and sharpness to the multi-dimensional needs concept, and to the changed balance of factors influencing decisions in changing situations. It will be developed further in the next chapter.

In this section writers' varying explanations of human motivation and behaviour have been considered. A complex picture emerges of multi-dimensional needs and goals which a person seeks to fulfill by his actions. During his working day the satisfaction of those needs, and his range of actions, is both constrained and facilitated. The organisation gives him identity and possibly economic security. At work he may find satisfaction of his achievement and social needs. Professionals in particular have to strike a balance between the economic and technical criteria of their field of knowledge, their social commitment to their client, and the personal need for achievement and realisation of their intellectual potential. A combination of expectancy theory and needs theory would appear to have

potential for clarifying this issue. In exchange for payment the employee contributes his element of activity to the organisation. There is an organisational calculus here - the individual activity is integrated into the total organisational function; those in control of the organisation differentiate tasks required to meet its purpose down to the individual. The next stage in our conceptualisation of this calculus must therefore be to refocus on the organisation. Since writers' views of individual behaviour are so varied one might expect to find a corresponding variety in their views on organisations.

2.3. ORGANISATIONS AND THEIR MEMBERS

Simon suggests that organisation theory can be divided into two. First a theory of motivation explaining a person's decision to participate in and remain in an organisation. Second a theory of decision making within organisations comprised of such people (1964, p.11). As we have already seen, he suggests that many organisation decisions do not affect personal motives at all, but he accepts that his simple two-fold division excludes significant knowledge of human relations and informal organisations obtained in recent years. The question must be, how relevant are these personal intrusions into organisational decisions in the context of change and professionalism? As writers' views of human motivation developed so too did their views on the working of organisations.

2.3.1. The Classical Approach to Organisations

The classical approach reflects a managerial view of organisations. Indeed the early writers in this school, such as Urwick (1943) and Fayol (1949) often had a managerial or military background. As such they shared the philosophy of the scientific managers referred to above. They viewed organisation as an interlocking set of parts

which, if designed, constructed, and controlled properly, would attain the desired objectives. Just as there existed one best way to design and structure an individual job (vide Taylor), so there also existed one best way to structure an organisation effectively. Such models are often accused of neglecting social aspects of individuality. In part this may be true but it would be more accurate to say that man's economic motivation was considered to be so strong that he would mechanically do what was required of him providing his economic needs were satisfied.

Whilst this criticism has been levelled against the classical writers, it has also been accepted that there is value in their systematic statements of the meaning and content of managerial activities, and of the principles of good management which, from their personal experience, they knew to be effective in practice (see O'Shaughnessy 1976). For example, Fayol (1949) a successful mining engineer and manager, defined management as comprising five elements:-

- | | |
|--------------|--|
| Planning | - examining the future and drawing up an action plan |
| Organising | - building up the human and material structure of the undertaking |
| Commanding | - maintaining activity among the personnel |
| Coordinating | - building together, unifying, and harmonising all activity and effort |
| Controlling | - seeing that everything occurs in conformity with established rules and expressed commands. |

Urwick (1942) expanded this list to include the seven elements: Planning - Organising - Staffing - Directing - Coordinating - Reporting - Budgeting. Both lists have formed a framework around which training in management has been structured.

The two writers reviewed some of the principles of good management which had guided them in the managerial tasks. After Simon (1964) these may be summarised as:-

- (i) Administrative efficiency is increased by a specialisation of task among the group
- (ii) Administrative efficiency is increased by arranging the members of the group in a determined hierarchy of authority.
- (iii) Administrative efficiency is increased by limiting the span of control at any point in the hierarchy to a small number
- (iv) Administrative efficiency is increased by grouping the workers, for purposes of control, according to (a) purpose (b) process (c) clientele (d) place.

Similar principles inform descriptions of the ideal bureaucratic organisation: (see for instance Downs 1967).

Simon derides these principles as little more than proverbs which, as such, are in several cases mutually incompatible. Yet the principles have, in fact, worked for managers (particularly for those in stable organisations like those from which the classical writers came) and, as Perrow points out, "are still working, for they addressed themselves to very real problems of management, problems more pressing than those advanced by social science" (1979, p.59). Writers such as Drucker (1964) continue to advance principles of good management and others like Carzo and Yanouzas (1967) continue to analyse the ideal structure for organisations. The fact is that system, structure and procedures are necessary for effective direction of complex organisations. They are, however, means of management rather than of understanding.

The classical writers maintain that a highly formalised structure with a directive or authoritarian leadership style will ensure high performance. Their "principles" such as those summarised and then

criticised by Simon, are strong on (to use the terminology of Lawrence and Lorsch 1969 - see below) "differentiation" but weak on "integration". The right man is chosen for the right cog in the machine and is then expected to perform efficiently at his appointed task in exchange for (primarily) economic reward. Coordination, or integration, is assumed rather than ensured. The writers generally minimised the problem of integrating the specialist parts of the organisation since, according to them, as Lawrence and Lorsch point out "the very process of creating the division of labour into highly specified roles also created the chain of command that assumed that the role performance would be carried out as specified. Thus the chain of command is the mechanism of integration" (1969 p.165).

In the military and stable environments described by the classical writers this may have been adequate but the more initiative the individual employee has, and the more interdependent he is with other workers, the more inadequate a purely "economic" view of man becomes. The individual job or role is never, in practice, a pure economic exchange. A specified individual performance cannot be bought like a specified material, or a piece of plant. Jobs are multi-dimensional as well as personalities and a wider range of factors is required to assist an understanding of both in organisations. Professionals, for instance, frequently have a high degree of autonomy and interact with a wide network of people. In these situations the individual contribution to the organisation activity is more complex than a regulated, simple, payment for work exchange. The task of integrating (and constraining) the individual activities comprising this transaction is correspondingly more complex.

2.3.2. The human relations approach

The concepts of man as a social and self-actualising being referred to in 2.2.2 and 2.2.3 above led, in the 1950's and 1960's, to changing views on organisations and their management. Concern for the individual as a person rather than as a cog in the organisational machine led to the concept of organisations as complex webs of human relationships. The rich field of conclusions reached by psychologists and sociologists adopting this approach is, in contrast to the classical approach, concerned with integration rather than differentiation. The human relations approach is concerned with leadership, motivation, and productivity, and with the structure of groups and their integration into the organisation.

Following the Hawthorne experiments, it seemed reasonable to link good management and high morale with high output, but subsequent research has failed to substantiate the relationship. Brayfield and Crockett (1955) surveyed some 50 studies published at that time concerning the relationship between personal attitudes to work and performance and concluded that there was little evidence to support a positive relationship. Lawler and Porter's survey (1967) suggested that the relationship should be reversed - with job satisfaction resulting from high performance. The link between good leadership and performance has been equally difficult to prove.

Thus the evidence for the incorporation of the "social man" concepts into the practice of organisational management has been inconclusive and contradictory.

The "self-actualising" man concepts have led to a wider view of the organisation and of the groups and individuals within it. The emphasis has been on the individual as a valuable resource who should

be given opportunities to develop and realise himself, and, in doing so, release his full energies to assist the organisation to achieve its goals. Three writers, McGregor (1960), Likert (1967) and Argyris (1957, 1964, 1973) are particularly significant.

McGregor emphasises that modern organisations need supportive relationships to be effective. He contrasts the "Theory X" assumption about human motivation, closely akin to the "economic" view of man, with the "Theory Y" assumptions which he recommends.

Theory X emphasises managerial control. Theory Y emphasises self control. The implications for the structure of an organisation and the differentiation of its task, is not clear. The emphasis is on developing attitudes which would encourage cooperation - and without cooperation there will be continued difficulties in coordination.

Likert (1967) postulates four basic management styles:

- System 1 - Exploitative/Authoritative
- System 2 - Benevolent/Authoritative
- System 3 - Consultative
- System 4 - Participative, supportive, integrative.

He suggests that most organisations tend towards System 2, whilst greater efficiency and effectiveness would result from movement towards System 4.

In his earlier book Likert (1961) expresses his concepts of the participative, supportive organisation in more structural terms. He conceives the organisation as being built up of overlapping work groups in which superior and supervisors will belong to two different levels of group and act as a "linking-pin" between them. They are the representative of their groups' views in the higher level group, whilst

the superior in that group continues the chain up the management hierarchy. This is more of a two-way concept than the classical writers' scalar principle but in structural terms it would make little difference. The difference is in attitude - of the supervisor as a democratic representative of his group's views rather than as a representative of management's authority. Horizontal differentiation of task and specialisation would still be necessary, but the vertical, hierarchical linkages are two-way with active commitment of the individual to the goals of the organisation rather than a passive exchange of performance for payment.

These views are closely in line with those of Argyris (1964) He contrasted the needs of the individual, aspiring after psychological success and self realisation, with the demands of pyramidal organisation structures, with their specialisation of work, chains of command and centralisation of authority. Classical management structures were liable to result in dependence, submissiveness, and the use of a limited range of abilities rather than self-actualisation. Instead of psychological success, Argyris claims that an individual is liable to experience frustration, conflict and psychological failure. In an attempt to move towards the situation where an individual's psychological energy is freed for productive effort, Argyris recommends a move away from pyramidal structures to open democratic structures in which there is devolved decision-making on all significant matters. One might ask why pyramidal structures cannot be of this nature. The argument seems to be directed against organisational process and culture rather than structure.

Evidence for the increase in organisational effectiveness which might result from the adoption of Argyris's democratic structure, Likert's system 4 management system or McGregor's Theory Y management

style is weak. Perrow (1979) shows that some of the oft-quoted studies in support of the benefits of supportive, self-actualising organisations, for instance, the regeneration of the Weldon Manufacturing Company (Marrow, Bowert and Seashore 1967) can be shown to result primarily from the adoption of "sound" classical management principles. In a different way Strauss (1969) questions the validity of the normative assumptions regarding harmony, conflict resolution and participation which underlie the human relations view. This is not to say that human relations are not important but rather that the weakness of the approach is its assumption that activity to satisfy an individual's social and achievement needs will invariably be similar to the activity required for organisation success. By implication it assumes that individual goals and organisation goals are congruent.

Clearly both the classical authority approach and the human relations supportive approach have their place in organisations. The one does not exclude the other. They may even complement each other. However, the transactions differ. There is an exchange of work for payment in the authority structure and an exchange of mutual social support in the social structure. Bearing in mind our concept of man's three dimensional needs one might go one step further and suggest that there may be three systems or structures operating: an economic system, a social system, and an achievement system. This can be linked to the ideas of Burns who developed a concept of multiple systems operating in organisations. He suggested that "an individual may invoke any of them as the dominant reference system for this or that action ... The ability of the individual to determine the social significance of his behaviour in this way presupposes a plurality of action systems available to him and the fact of determination by him presupposes that he can order these actions preferentially". (1965,

p.248) (12). But a plurality of action systems presupposes a plurality of decision systems and we must now turn to a group of writers who have concentrated on the decisions taken by individuals as the units of analysis in organisations.

2.3.3. The rational decision making approach

Three writers, Simon, March and Cyert expounded a view of organisations as coalitions of decision makers. In reaching decisions members act rationally but their human and organisational constraints set bounds to the extent of their rationality. Individual decisions are very fine units of analysis and can accordingly expose a more complex picture of organisations than that resulting from the generalised concepts of the classical and human relations writers.

Simon considered that the "anatomy of organisations is to be found in the distribution and allocation of decision making functions" (1976, p.220) and that a scientific description of such an organisation must designate "for each person in the organisation what decisions that person makes and the influence to which he is subject in making each of these decisions". Simon was concerned with the rationale and psychology of administrative decisions and the contributions and loyalties of organisation members. In terms of integrating individual behaviour into organisational performance Simon discusses the reasons individuals decide to join and remain in organisations, the environment of and constraints upon their decision making as members and their contribution to the means-end chains through which organisational goals are set. The same matters are considered in March and Simon's "Organisations" (1950).

The decision to participate in an organisation is conceived as a balancing by individuals of the material, sociological and professional

inducements offered by the organisation against the contribution they must make to the organisation. An individual will remain a member so long as the balance is perceived as being in his favour and no greater net benefits would arise from moving elsewhere. (13). In particular the writers comment on the significance of the individual's identification with the organisation and its goals. They differentiate between the personal decision to participate in an organisation and the impersonality of his subsequent organisational decisions. But over time he may become identified with the organisation so that he becomes personally committed to the organisation's goals. This could mean that behaviour which initially meets economic needs (because of the payment by the firm for organisational activities) in the long term also meets social or achievement needs because of self-identification with the organisation, with its members, or with its dominant professional group.

Quite apart from this process of identification, organisations constrain and facilitate the individual's decisions for organisational ends. Simon shows that an individual can rarely be fully rational in reaching decisions. He has incomplete knowledge of the problem, and lacks accuracy in evaluating alternative strategies, or indeed the consequences of those strategies. Organisations set the psychological environment for his decision making, providing him with knowledge, stabilising his expectations, providing routines and programmes to simplify his response, and coordinating his actions by integrating him into a group. So an individual's activity and decisions are "bounded" by the "givens" of the organisational situation: knowledge about future events, about the alternatives available, about the consequences of the alternatives, and about the organisation's preference among the alternatives. In this environment, say Simon and March, individuals

and groups "satisfice" rather than optimise, take problems sequentially rather than together and have a repertory of semi-independent action programmes to cope with a short range of situations (March and Simon 1958 pp 141-150).

Organisational activity is the summation of these elemental action programmes into low level performance programmes which can in turn be selected and combined to produce the organisation's standard performance programmes. The writers point out that most organisation behaviour is made up of performance programmes of this nature, with occasional adaptation. This integration of individuals', generally standardised, action programmes into organisational activity is consistent with decision making in means-ends chains in the organisation. Simon describes a hierarchy of goals, differentiating the organisational goal down into successive levels of sub-goal, with each sub-goal the "end" relative to a level in the organisation and the "means" for the level above. This integrates behaviour in organisations. He notes that some activities can be an element of more than one means-end chain. Thus one may picture an individual's activity as a strand in his life interwoven with the corresponding strands in other members' lives to produce the main fabric of organisational activity. At that moment his action will be a common element of two goal hierarchies - his own and the organisation's.

So Simon and March describe the bounded organisational rationality of the individual member and the way his decisions and activities are integrated by the organisation and the manner in which its goals are differentiated down to the operational group or individual. This process is not free of uncertainty or conflict. Conflict in decision making is dealt with more comprehensively and pragmatically in Cyert and March's "A behavioural theory of the firm" (1963). They accept that

there is bound to be latent conflict and lack of internal consensus in organisations because of the differing goals of its members. The writers suggest that the "quasi-resolution of conflict" is obtained by the factorisation of problems to permit local rationality to be exercised, by adopting satisficing rather than optimising level decision rules and by the sequential attention to (potentially conflicting) goals.

There is a risk here of reification (14). People have goals - collectives of people do not. Yet for a theory of organisational decision making one needs something analogous at the organisational level to the goals of individuals. The writers emphasise the concept of the organisation as a coalition in which one can identify the dominant members and their goals at a particular moment or for a particular problem. Organisational goals are accordingly the result of a continuous bargaining and learning process among the dominant members of the organisation coalition. As a result of this process organisation goals are likely to be imperfectly rationalised and stated in non-operational terms. They conclude that goals are a series of more or less independent constraints imposed on organisations through a process of bargaining among potential coalition members.

Simon (1964) expands this concept to broaden the meaning of "organisational goals". He shows that, in a decision making situation an acceptable course of action must satisfy a whole set of constraints. One of these constraints may dominate and be taken to be the goal of the action. Generally it will be better to refer to the whole constraint set as the goal of action. In this sense organisational goals are the constraint set to all decisions in the organisation, or to the upper level roles in particular. Simon uses a linear programming expression of the constraint set to illustrate the point

that the "decision equation" of individuals can contribute to the decision making set for the whole organisation to produce an optimal solution.

Simon, March and Cyert therefore illuminate the wide range of decision making behaviour exhibited by organisations and their members. From an organisational viewpoint the treatment of the integration of individual decisions into organisation purpose is perhaps disappointing. So too is the emphasis on economic and technical rationality. Writers such as Storing (1962) and Argyris (1973) have criticised Simon's rationalist approach. If, however, we accept the possibility of multiple forms of rationality, facilitating not only economic motives but also social motives and achievement motives, the decision making model can embrace a multi-rational approach. Indeed, in their acknowledgement of the varying and conflicting needs and goals of coalition members in organisations Cyert and March are moving to common ground with the human relations school of writers.

Providing, then, multiple needs and multiple systems of rationality are included in the decision making model, it would appear that it could provide a comprehensive picture of decision-making and activity in organisations. However interdependence between individuals will have to be examined further and in particular the interdependence of the organisation with its environment. In this study we are specifically concerned with a group who are influenced by factors outside the organisation. The organisation's environment is also their own - influencing them directly as well as indirectly through the organisation. For many the indirect link will have the strongest impact. To study this indirect source of change necessitates another change of focus, to view the organisation as part of its larger system.

2.4. ORGANISATIONS IN THEIR ENVIRONMENT

During the 1960's a number of studies were published which endeavoured to discover the contingent links between an organisation's efficient performance and various aspects of its external environment (15). Burns and Stalker (1966) were concerned with technical firms in uncertain environments. From studies of Scottish firms in the electronics industry they showed that those with a "mechanistic" structure were less able to cope with change than those with an "organic" system. Mechanistic structures followed classical management lines, with clear differentiation of task and communication primarily up and down the chain of command. Organic structures, by contrast, were more loosely organised with individuals working within broad guide lines, with little hierarchical structure, and lateral, rather than vertical communication. The writers concluded that mechanistic structures were appropriate to stable environments whilst organic structures are better suited to unstable conditions.

The link between environmental characteristics and organisational form is explored more fully in the writings of Lawrence and Lorsch (1967, 1972). They view organisations as open systems constantly interacting with their external environment. They build on concepts of writers such as Rice who described the systems viewpoint as "a broad conceptual framework that relates individuals, groups and institutions to each other in one coherent system. Individual, group and institution can each be described by their internal and external environments and by the organisation and management of the transactions across the boundaries" (1963, p.10). They argue that organisations should be viewed as open systems (16) - that is as maintaining themselves by exchange with their environment. Lawrence and Lorsch further note that "as systems become large they differentiate into

parts and the functioning of these separate parts has to be integrated if the entire system is to be viable". Also that "an important function of any system is adaptation to what goes on in the world outside" (1967, p.7).

For technical organisations, the external environment consists of the body of knowledge and information which organisation members must absorb and act upon if the organisation is to achieve its goals together with those other individuals and organisations with whom the organisation must interact. The writers postulate a contingent relationship between a firm's external environment, its internal structure and the attitudes of its managers, and its effectiveness. From their research they concluded that, in effective organisations, each division had developed characteristics which enabled it to deal with its particular sub-environment. Thus in the more successful firms studied, the degree of diversity in the firm's environment was directly and closely related to the degree of differentiation in the functional units. They defined differentiation as "the difference in structure and in cognitive and emotional orientation among the managers".

But the greater this differentiation, the more essential it is for managers to ensure that the activities of the individual divisions and their members are coordinated or integrated, to achieve the firm's overall objectives (17). The problem for managers is to obtain the right degree of differentiation to match the environment whilst maintaining a corresponding degree of integration among the specialised units. Integration, to Lawrence and Lorsch, is "the quality of the state of collaboration that exists among departments that are required to achieve unity of effort by the demands of the environment" (1967 pp 10, 11).

Subsequent writings extended the concepts to include the characteristics of organisation members themselves and the pattern of interdependence between units. Organisation members were brought into the contingency concept by Lorsch and Morse (1974). Building on the earlier work of Lawrence and Lorsch, they concluded that effective performance by a unit was contingent upon a fit between the external environment of an organisation, its internal environment for the individual members and the individual member's own characteristics and motivation. They examined individuals' attitudes to uncertainty, authority and others in their task environment, and their personal sense of competence (one could relate these characteristics to the individual's economic, social and achievement needs). They related these to a range of variables in the internal environment, and then related these personal factors to the Lawrence and Lorsch measures of the external environment. Surprisingly they found a good fit between personal characteristics and the requirement of the external environment in the majority of members interviewed, whether in high or low performing units. In the low performing units however there was a low sense of competence among the managers and lack of fit between the internal environment and the attitudes of the personnel on the one hand and the external environment on the other. They therefore concluded that the fit between the individual's predispositions and the unit's external and internal environments is related to both unit performance and the individual's feeling of competence through a complex set of relationships (18).

Lawrence and Lorsch (1972) considered the question of interdependence in the light of Thompson's (1967) typology of interdependence. As we have seen, the two writers had been concerned with the integrating mechanisms necessary to coordinate the work of

differing units working in varying sub-environments to achieve the organisation's objectives. Whilst the management hierarchy traditionally provides one system for resolving difficulties they noted that many organisations had found it necessary to form integrating teams or use individual integrators to promote the necessary "state of collaboration". They found that the organisations operating in the most uncertain and diverse environments had the most elaborate mechanisms. Following Thompson they later related these varying mechanisms for integration to the degree of interdependence between units. Thompson had described three forms of interdependence. With "pooled" interdependence each unit contributes to, and draws resources from, the whole but is independent of other units. In "sequential" interdependence units are in a hierarchical relationship with other units with a one-way dependence on output or input. "Reciprocal" interdependence involves units integrated with others for both output and input so that units to some extent interpenetrate others. Thompson shows that these three forms of interdependence involve an increasing scale of coordinating complexity, and place an increasing strain on the organisation's communication system. In pooled interdependence coordination can be achieved by established rules, regulations and procedures. Sequential interdependence is a more complex relationship, requiring schedules, programmes, and control feed-back to maintain output. Reciprocal interdependence involves frequent adjustments between units and, typically the appointment of personnel in specific integrating roles. Lawrence and Lorsch showed that these increasing degrees of interdependence were related to increasing degrees of differentiation in firms and diversity in their environments - and hence to the increasingly sophisticated integration devices described in their earlier work.

This consideration of interdependence is a valuable addition to contingency theory because it stresses the concept of exchange between individuals, between units, and between organisations and their environments, which must underlie the contingent relationship. Inevitably there have been criticisms of the methodology, such as that by Tosi, Aldag and Storey (1973). Others have criticised the underlying philosophy and outlook of Lawrence and Lorsch's work. Child (1973) for instance considers their theory to be inadequate in that it makes no reference to the political processes within organisations. "Decision making about organisations", he points out, "is not simply a matter of accommodation to operational contingencies. It is equally a political process into which other considerations, particularly the expression of power holder values, also enter." (p. 240). In a similar vein he "draws attention to the inadequacy of regarding situational 'contingencies' as functional imperatives on organisation design". The relationship, he suggests, is too "mechanistic", ignoring the fact that some variation appears possible in the design of organisations without apparently incurring serious consequences (19). This suggests that Lawrence and Lorsch take too abstract a view of organisation/environment dependence. The environment and the organisation are populated by individuals.

Different groups and individuals belong to different social systems (Wood, 1979), have different goals for the organisation, and different criteria for measuring effectiveness. It was suggested above (section 2.3.2) that organisations have a plurality of internal action systems. Presumably these systems can extend out into the environment. Then we may assume that differentiated units of the organisation share an action system with their relevant sub-environments. In this they will share common values, orientations, certainties, and rationalities.

This would appear to be a legitimate interpretation of Lawrence and Lorsch's finding regarding an organisation's segmentalisation of its environment. We may, for example, quote the case of the technical action system for engineers in highway organisations. Their professional group extends out from their own authority to fellow engineers in other authorities in their environment, and to fellow members of their professional institutions.

Action systems remain somewhat abstract concepts. If we recall that they are in fact made up of groups of individuals whose activity has a common or associated objective then it will be interaction between members of one or other of these systems which gives expression to the organisation's interdependence with its environment. To reveal these complex patterns of interaction, it would appear that network concepts should be of value. These were developed to provide analytic tools for social or action systems of this nature.

2.5. THE NETWORK APPROACH TO ORGANISATIONS, THEIR MEMBERS, AND THEIR ENVIRONMENT

We have seen that the contingency approach tends to look upon an organisation's environment as a set of givens "out there" yet this can be seen to be a gross generalisation (see for example Emery and Trist 1960). The network approach breaks down the environment into an inter-related set of organisations and/or individuals. There is a sociological emphasis on informal groups rather than formal organisations in this literature. Clyde Mitchell (1969) has described the development of the concept from the purely metaphorical to the complex mathematical analysis of today. Evan (1966) expanded sociological concepts to the study of inter-organisational relationships. In following his lead there seems no reason why the intra- and inter-organisational networks should not be combined, with

boundary spanning individuals acting as mediators between their organisation and its environmental network.

We will refer to the points where links in the network intersect as nodes. These may be people, groups, or organisations, and the links in the network are relationships between them. Networks of this nature will provide analytical concepts and aids to investigating actual situations and the data handled will be relational. Network concepts do not provide theories or explanations of organisations but they provide a valuable model of the interdependencies between individuals and organisations involved in shared activities and interests.

Of course the network is an abstract view of the organisation - "an abstract representation of its component system of relationships", as Clyde Mitchell argues (1969, p.45). He describes the sequence of analysis from the initial act of observation of actual behaviour, first to the drawing up of a network of multiplex (multi-purpose) linkages, then to the construction of a "partial network" of links with a single specified content, leading to a representation of the organisational structure. Nadel (1957) identified a similar process of abstraction in the case of the study of individuals. He showed how concrete behaviour becomes abstracted to a role which, in turn, emptied of all qualitative features, becomes a position in the organisational structure.

With these concepts one may investigate the morphological characteristics of a network (the patterning of links in relation to each other) and its interactional characteristics (the nature of the links themselves). A morphological study of the data on relationships will reveal the shape of the network, and the groupings within it. This will identify what Aldrich (1979) and Evan (1966) define as the Organisation Set - those organisations with which the focal organisation

has relationship, and the Action Sets - the groups of organisations which are in temporary alliance for specific purposes or activity. Comparable groupings at the individual level are Role Sets - the complex of roles and relationships which the occupant of a given position has by occupying that position. Sociological measures of the characteristics of social networks (such as the measures of density and connection described by Boisserain 1974) have no immediate relevance to this study of individuals in formal organisations, though the centrality of an individual clearly has. This is a measure of the degree to which a person is accessible to others in a particular network. More graphically the relative centrality of individuals will be apparent from the configuration of a network. Boisserain suggests that "in a differentiated network where only a limited number of transmissions is permitted, the most central person or sub-group will be the best informed and most influential" (1974, p. 42). This must presumably be particularly relevant in formal networks.

A dense patterning of links will demonstrate groupings within the network and less dense linkings will illustrate the degree of independence or differentiation between groups. Aldrich (1979) following Weick (1976) refers to groups which have weak linkages between each other as "loose coupled". This is seen as significant, because having structures and activities within it which are weakly connected to each other brings stability to an organisation or network. Change in an individual element may be absorbed within that element without transmitting it to the whole system (further see Aldrich 1979 p.75 et seq).

Whilst a morphological study of an actual network may therefore reveal centres of influence and degrees of independence and autonomy, interactional data will reveal more about the roles and constraints on

individual nodes in the network. It will provide details of the functions of the linkage in the network. The links derive from the participants' differing activities - role relations in the case of individuals, organisational relations in the case of larger groups. In the case of the latter, relations between organisations are a function of the role sets of the boundary personnel. Boundary spanning roles are therefore significant in inter-organisational studies - and Aldrich (1979) describes their function in processing information into the organisation and acting as its representative to the environment. As the environment becomes more complex, so do the boundary spanning roles, and it has been suggested that there may be conflict and ambiguity for those at the boundary in these circumstances.

There is exchange along the links of a network. Galaskiewicz (1979) identifies the exchange of money, information and moral support as being particularly significant for individual actors and organisations alike - money for the satisfaction of their adaptive (i.e. economic) needs, moral support for satisfaction of their legitimacy (i.e. social) needs and information for satisfaction of their problem solving (i.e. achievement) needs. So analysis of the content, direction, and frequency of links will give valuable information about the interdependencies in the network. Plotting partial networks of, say, authority and social linkages will differentiate between what was referred to as the formal and informal organisations by the human relations school of writers but which can now be seen to be constituent partial networks of the whole system. From the consideration in 2.3.2 above, we would expect to find multiple networks (or action systems) facilitating the individuals realisation of multiple needs.

If the exchange between nodes is asymmetrical then there is a power difference in the relationship. Conflict and uncertainty can arise when a pair have incompatible expectations of their command over one another. Command over resources, as Nadel (1957) notes, may contribute to power over others, which may itself be perceived as a benefit or be a means of achieving more material benefits (more generally see Pfeffer 1981). Individual actors must take account of the network constraints in deciding on their individual actions.

So from both a morphological and an interactionist viewpoint network concepts provide a valuable framework within which to examine activity and interaction in real organisations, and between them and their environments. Yet network studies take a somewhat static view of the organisation. Its structure, though transitory, is generally taken to be constant for the duration of the study. But Nadel (1957) makes the cogent point that social positions in that structure are described in terms of behaviour sequences which consume time, and happen on a time scale. Organisations' outputs are achieved by the activity of their members over time. And organisations themselves change over time. We must consider what additional insights into the workings of organisations and their members may derive from a dynamic view of organisations. Modifications to organisations over time are considered in the literature on organisational change (20). Organisations' achievements over time are a link in the chain between policy decisions and policy outcomes considered in the literature on policy implementation. (21).

2.6. IMPLEMENTING CHANGE IN ORGANISATIONS

We are concerned with the impact of organisational change on individual perceptions and of individual behaviour on organisational

performance - both over time. If we combine the two we may consider individuals "implementing change". But what is the link between implementation and change? Van Meter and Van Horn consider that policy implementation "encompasses those actions by public and private individuals (or groups) that are directed at the achievement of objectives set forth in prior policy decisions" (1975, p.447). Their study of the implementation process begins when goals and objectives have been established and they point out that the process will vary depending on the nature of the policy to be carried out. In particular they are concerned about the amount of change involved for the participants, and the amount of goal consensus among them. For Van Meter and Van Horn implementational success is contingent upon these factors. For writers on organisational change, success in changing structures, process, or function is contingent upon similar factors. Both the implementation literature and the change literature therefore contain elements of what might be termed a contingency view of their respective processes (which may be closely related if the objective of the policy to be implemented is organisational change). Both also contain more detailed consideration of the impact on, and activities of, individuals. Because we are concerned with individuals experiencing change caused to a large part by policy decisions or new objectives by central government or local politicians we must refer briefly to both groups of literature.

2.6.1. Contingency views of implementation and change

Van Meter and Van Horn move on from a consideration of the influence of the degree of change and participants' consensus on the success of implementation to propound a general model of the process (Fig. 2.1). Three factors in the environment of the implementing agency are identified: firstly the policy itself (and its standards,

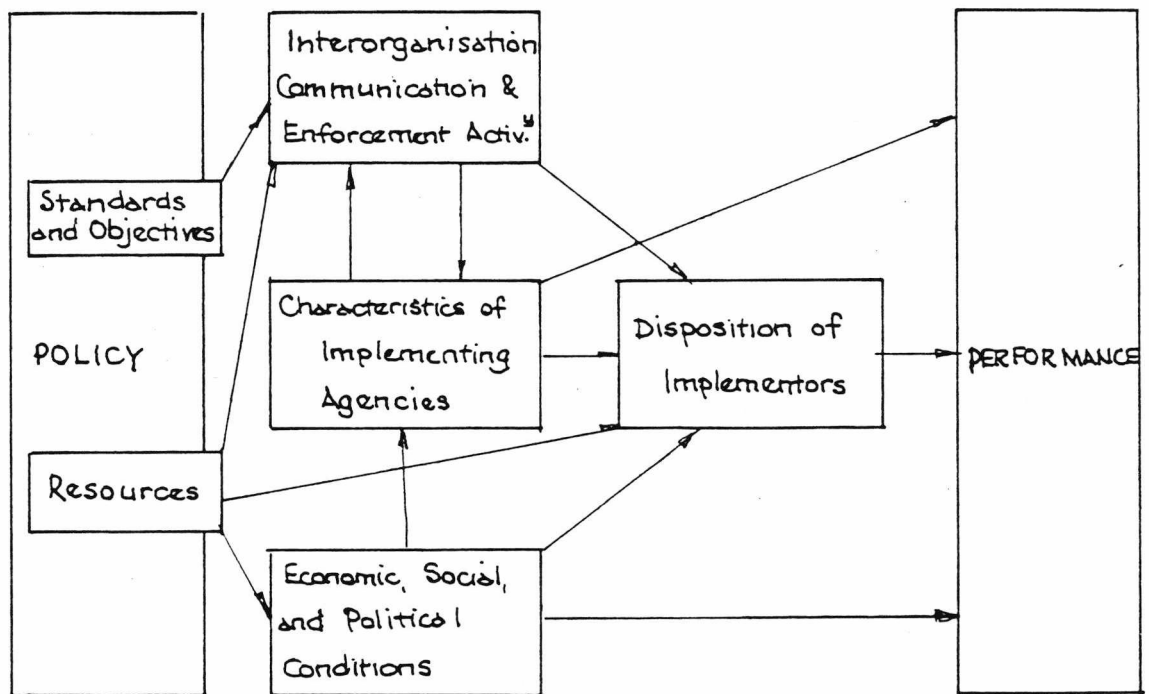


FIG 2-1 MODEL OF POLICY IMPLEMENTATION PROCESS

From Van Meter and Van Horn (1974) p. 462.

objectives and enabling resources), secondly the group of organisations communicating with, and constraining the implementing agency in its task, and thirdly the overall economic, social and political environment in which the agency exists.

The policy initiative comes to the implementing agency through its inter-organisational links and its reaction will depend upon the clarity and accuracy with which this is transmitted. The degree to which the agency is constrained to accept the initiative will depend on the sanctions which may be exerted on it via the inter-organisational links, the acceptability of advice offered and the resources made available by the policy. The other environmental links also act as constraints, both supporting and inhibiting the organisation, particularly if the status quo is affected.

These same factors influence the individual members of the agency, particularly those at the boundary who personally experience political and social pressure from the public, elites and private interest groups. In addition agency members will have their own reaction to the policy - for or against, passive or active, high or low intensity.

The characteristics of the implementing agencies will influence the effectiveness of the implementation process. Van Meter and Van Horn refer to a number of factors which may be significant: the competence and size of the staff of the agency, its authority structure and procedures, its vitality and political resources, and the openness of its vertical and lateral communication channels. Hage and Aiken (1970) identified a similar range of variables affecting an organisation's adaptation to change. They name four structural variables: complexity, in terms of varying skills, professions and disciplines; centralisation, in terms of power and decision making;

formalisation, in terms of organisation rules, precedent and regulations; and stratification, in terms of the number of layers in the hierarchy, and the differentiation of the reward structure. It would be wholly compatible with the Van Meter and Van Horn model to include these factors among the critical characteristics of a change implementing agency. Burns and Stalker's (1960) study of the relationship between organisational structure and adaptability to change would also appear to be compatible with the model (see Section 2.4 above).

Kaufman (1971) considers personal and organisational factors of this nature which inhibit sudden change, but points out that incremental changes in the environment or within members can be accommodated more readily by adaptation over time. The ability to do so will be dependent upon the stability of the organisation itself during changes. Gowler and Legge (1978) consider attenuative change (decreasing rates of change) and accentuative change (increasing rates of change) processes on differing types of organisational structures and the varying states of equilibrium which will prevail within the organisation concerned. In the unstable accentuative process they drew attention to the tendency of individuals to engage in "behavioural drift" - carrying on activities which are the proper concern of those above them or below them in the organisation.

For our purpose one value of the literature on both change and implementation is its emphasis on the contingent factors influencing organisational process (whether of change or of implementation). This complements the contingency writers' ideas of the contingent factors (primarily in the environment) influencing organisational structure.

2.6.2. Individual activity in implementation and change

A further value of the implementation and change literature is the emphasis on individuals - the nodes in our organisational network. We can visualise them as points of transmission and/or resistance. Pressman and Wildavsky (1973) describe the influence of individual "decision points" on the Economic Development Administration's degree of success in implementing an employment programme at Oakland between 1966 and 1976. They found that the programme was seriously prejudiced by delays, and that these stemmed from the number, and attitudes of the "decision points". Delay, that is, was a function of the direction and intensity of interest of the participants and also of the vulnerability of the implementing system to pure chance.

Resistance to change in organisations also depends on the attitudes of those affected. "It is not the change itself which causes the resistance, but the meaning of the change for the people involved" (Sayles and Strauss, 1966). Change will cause anxieties that individuals needs may be threatened. Johns (1973) relates these sources of resistance to threatened economic needs (reduced wages, the unknown), threatened social needs (breaking of social ties), and threatened achievement needs (deskilling of job, fear of greater specialisation). Other writers consider the extent to which individuals resistance to change may engender "displacement of goals" - when adherence to traditional rules and regulations becomes an end in itself rather than a means to a (changing) end. Blau (1963) found that ritualism of this nature stemmed from lack of security in significant relationships rather than over-identification with rules and practice. Insecurity bred rigidity.

This emphasis on needs and relationships is particularly germane to this study. The nodes in the network will clearly act as a focus for change and, potentially, as points of resistance. Van Meter and Van Horn were no doubt justified in anticipating that the degree of resistance would be proportional to the degree of perceived change. We would add that perceptions of change will be related to the extent to which individuals feel that their needs are threatened, and their relationships with, and dependence on, others are altered. It is as if individuals seek a state of equilibrium in their lives, and a balance in the influences acting on them - acting to restore that equilibrium and balance when they are disturbed by external change.

But individuals in organisations are not merely the recipients of external pressures and influences - they also act as transmission points. Dunsire (1978) refers to the node occupants in organisations as "office holders". He suggests that they perform two main functions in organisational systems: as a collecting point and storage centre for relevant information (from within or without the organisation) and as a transmission point, translating information into the "language" of the would-be recipient (i.e. summarising and removing uncertainty for upward transmission and operationalising for downwards transmission). He expands on the function of these individuals in the implementation process which he views as a sequence of activity passing through an organisation or system. He investigates in considerable detail the organisational processes, controls and functions associated with two views of organisational relationships - as a pyramid and as a network.

The pyramid view of organisational activity is concerned with the number, ordering and stages of the implementation process down an organisation, from the first stage at the top of the pyramid to the last at or near the base, from the general to the particular, from the

abstract to the concrete - with interpretation, operationalisation, and narrowing discretion at each level. The network view is concerned with chains rather than stages and implementation as a process of making chains and forging links. The links may well be standard programmes, and much of the implementation process will be accomplished by "switching in" one or more chains or links.

This leads Dunsire to develop two models of the implementation process - the Developmental approach and the Aggregative approach. The Developmental approach relates to the pyramid model of organisations, with each stage in the implementation process a necessary and sufficient condition of succeeding stages. The process is one of "pragmatisation" from the general to the specific, from the undifferentiated to the differentiated, from the abstract to the concrete. The Aggregative approach relates to the network view of the implementing organisation(s). Thus the process is viewed as one of making chains of discrete activities, with each unit or link accepting the output of the preceding unit, carrying out some transformation or operation and passing it on.

Both the developmental and aggregative approaches are relevant to our view of organisations as networks of interdependent individuals, though Dunsire identifies only the second approach as a network concept. We would prefer to view the aggregative approach as a sequence across the technical network while the developmental approach typifies the sequence of operationalisation which occurs as instructions are passed down the links in the authority network.

Bardach (1977) expands on implementation as the assembling of the elements required to produce a particular programme outcome and strategies whereby elements are withheld from or delivered to the

programme assembly process on particular terms. In doing so he examines in some detail the games individuals and groups play in "co-opting" plans, learning new behaviour or controlling the flow of resources to a programme. Clearly multiple motives lie behind the attempts he describes of nodes to divert resources, deflect policy goals, resist control and dissipate participants' energies whilst delaying or adapting the implementation process.

Because change in organisations is transmitted through the links in the social, technical and authority networks, these descriptions of the process of "micro-implementation" (see Berman 1978) have parallels with descriptions of the process of change. Healey and Underwood (1978) describe the strategies adopted by planning officers to protect their autonomy during a time of increasing political and bureaucratic constraint. More generally Burns (1969) describes the "pathological systems" adopted by organisation members in an endeavour to make mechanistic systems work in new situations.

So not only does the change and implementation literature provide fresh insight into the contingent factors influencing organisational processes. It also concentrates attention on the actions of individuals in those processes. This focus on the actions of individuals is particularly relevant to this study. Because it emphasises that their actions depend on their interpretation of the situation, it has common ground with the Action frame of reference. "The characteristics of social action is that it is motivated. It assigns meanings to situations and to the acts of others, and thus the individual reacts to his definition of the situation" (Silverman 1970, p. 33). A concern with the meaningful action of the nodes in organisation networks whilst they are "implementing change" must clearly underpin this investigation.

2.7. CONCLUSION

Organisations exist for specific purposes and seek to achieve them by the coordinated activity of their members. This chapter has summarised a number of writers' views on individual behaviour and organisation activity (22). Writers ascribe individual behaviour to varying motives. Early in the century man was assumed to be motivated by his financial needs, performing his tasks with mechanical precision if adequately remunerated (2.2.1 above). Later writers gave greater prominence to his social needs and group behaviour became the principal issue (2.2.2 above). With a widening view of man's potential, interest turned to his higher needs - for self realisation and achievement (2.2.3 above). And so, in 2.2.4, we turned to a review of man in his complexity, with a suggestion that his needs might be considered to lie in three dimensions - an economic dimension, a social dimension and an achievement dimension - each with its own set of goals, and hence each with its own rationality. In addition, we suggested that Vroom's formulation of expectancy theory might provide a basis for understanding the means-ends decisions taken by individuals in pursuit of their goals. These concepts will be expanded and specified more precisely in the next chapter.

A single action may contribute to the relief of all three sets of needs, or a sequence of actions may meet one need only at a time. The organisation seeks to inhibit those actions which do not contribute to the achievement of its purpose and to encourage, control and integrate those which do. The classical approach (2.3.1 above) took a mechanistic view of organisations, in which units of human activity could be bought, shaped to organisation purpose, and fitted into the designed organisation machine. Because individuals did not fit into this simple mould greater attention had to be paid to the full

complexity of human needs and the emphasis turned to fitting the organisation for the individual rather than the individual for the organisation (2.3.2 above). In parallel with the psychologist's view of organisations as made up of individuals seeking to achieve complex social and achievement goals, there developed the economist's view of individuals in organisations as rational decision makers (2.3.3 above). These multiple views of organisations led to the writer's suggestion that multiple systems of relationships operate in organisations. Via these systems man may seek satisfaction for his needs in different ways: for his economic needs through exchange in the authority system, for his social needs through exchange in the social system, and his achievement needs through activity (in the case of engineers) in the technical system. These objectives may, of course, bring them into conflict with others in those systems who seek or control the same resources.

The contingency approach (2.4 above) took a wider view of the organisation, recognising its relationship to its environment and stressing the need to match the organisation's structure, process and internal attitudes to the dominant characteristics of the environment. We have argued that the framework of relationships underlying this rather amorphous view of the organisation and its environment may be examined by network concepts (2.5 above). Multiple functions in the links of the network and multiple motives of the occupants of the nodes may best be investigated by isolating separate networks for each of the systems referred to above. Contingency concepts would indicate that the suggested multiple action systems operating within the organisation might extend out into the environment, so that a sub-unit in the organisation and its sub-environment share values, objectives, and rationality. It follows that within these specific action systems,

linking organisation and environment, there will be specialised links through the boundary roles.

The principal interest for this study is not how organisations shape their structures and environmental relationships to achieve the "best fit", (i.e. the issue that dominates the contingency theory debate) but rather what happens when change in the environment is not matched by change in the organisation, specialisation and relationships. There may then be an overlap of action systems and a mis-match of values and orientations. Not only will this make the organisation and its processes less effective, but it will also cause conflict among and for members.

In 2.6 above the organisational change and policy implementation literature was considered in relation to these matters. Its insights into the contingent factors influencing processes and the actions and reactions of individuals were found to be particularly relevant to this essentially "bottom-up" study of organisations "implementing change".

The search for a consistent framework from which to understand change among individuals in highway organisations has therefore led to a view of individuals as having multi-dimensional needs and goals, organisations as being multiple networks (or action systems) and the environment as having links to the organisation which are specific to each of its action systems. Within this framework individual decision making and meaningful action remain the basic units of analysis. We will explore these concepts more fully in the next chapter and in particular how they may be influenced in the case of the subjects of this study - professionals in local government organisations.

In "Exchange Networks and Community Politics" Galaskiewicz expressed the hope that "by using structural imagery and network

methodologies" he could "ground theories of collective decision-making and ... give them clearer empirical meaning" (1979, p. 154). Our objective is similar: by using three dimensional imagery and network methodologies we hope, in the next chapter to ground theories of individual and collective decision making during a time of change and give them clearer empirical meaning.

Notes to Chapter 2

1. In this sequence the individual is the common element. A "framework" for understanding individual action must therefore be applicable at the individual, organisation and inter-organisation level to be "consistent".
2. No doubt some activity in organisations is instinctive, irrational or unmotivated but "it is reasonable to assume that most of the behaviour exhibited by individuals on their jobs as well as their behaviour in the "job market" is voluntary and consequently motivated" (Vroom 1964 p.9).
3. This is not to argue that dominant personalities or cliques do not impose their own will on the organisation or use the organisation to their own ends (see for instance Dalton 1959)
4. Clyde Mitchell (1969) refers to three uses of the concept of networks: metaphorical, analytical (using graph theory) and sociological (as a set of persons in touch with each other). We are here tending towards the third usage.
5. See note 3, Chapter 1
6. "Roughly speaking, rationality is concerned with the selection of preferred behaviour alternatives in terms of some system of values whereby the consequences of behaviour can be evaluated" - Simon 1976 p. 75.
7. There is an extensive literature on the development of industrial relations that explores this issue. See for example Fox 1974, ch. 4 - 6.
8. Details of the experiments are beyond the scope of this review but we should perhaps take note of the "Hawthorn effect": employees reacting in a favourable though unpredicted manner primarily because they felt themselves to be singled out for special treatment and taken notice of by management. This in particular poses difficulty for those carrying out research in their own organisation, like the author of this study.
9. There is difficulty here in defining terms. Power may be partly an "existence" need, partly a "growth" need or even a reflection of social needs. "Achievement" obviously contributes to growth but may not be self-actualising. However, on the whole McClelland's categories bear close resemblance to Alderfer's, though with rather more specific intent.
10. In this study we are tending to refer to needs, motives and goals rather than values. As Rokeach (1973) points out, some writers take needs to be equivalent to values and his use of the terms instrumental and terminal values is analogous to our use of lower order and higher order goals. It is accepted that individual attitudes and values influence chosen goals.

11. Rokeach's investigation of the relationship between values and behaviour indicated that "socio-economic, political and religious values are the most powerful determinants of attitudes and behaviour" (1973, p. 159). We may relate political values to social needs and religious values to self realisation or achievement needs to relate Rokeach's findings to our chosen needs groupings.
12. Burns refers to a plurality of social systems but the term action systems is used here to differentiate between social systems and economic or achievement systems.
13. The assumption here is that there is a free market in jobs and an individual is free to move when he considers it desirable to do so. It is also assumed that he will make the necessary contribution if he remains with the organisation - that he will co-operate voluntarily (for difficulties implicit in this concept see Thurow 1983 pp. 201, 202).
14. "Reification" is defined by Silverman as "the attribution of concrete reality, particularly the power of thought and action, to social constructs" (1970, p.9). Mouzelis differentiates between various types and levels of reification and suggests when a measure of reification as a short-hand expression of reality is justifiable (1975, p.xiii - xvi).
15. No reference is made here to the work of Woodward (1965) who was concerned with contingent relationships between a firm's task environment (its manufacturing technology and processes) and its organisational structure rather than its external environment.
16. In contrast with the closed system view of the classical organisation theorists - that is that organisations are independent of environmental constraints.
17. Greenwood, Hinings and Ranson (1975) consider a wide range of contingent variables influencing differentiation and integration in Local Government organisations. They are primarily concerned with inter-departmental and committee structures rather than the intra-departmental focus of this study.
18. One wonders whether it might not be the differing styles and attitudes among managers of the successful and unsuccessful units which influence unit performance, and the individual members' sense of achievement and competence.
19. Burns (1969) would, however, point to the proliferation of "pathological systems" within organisations which do not adapt to environmental contingencies.
20. See for example Gross et al (1971), Kaufmann (1971).
21. See for example Elmore (1978) and Dunsire (1978).
22. In this chapter we have not referred directly to the extensive literature on professionals and professionalisation (see for example Etzioni 1969, Harries-Jenkins 1970 and Johnson 1972). Consideration of these "special cases" of individuals in organisations is concentrated in Chapter 3.

CHAPTER 3

DEVELOPING CONCEPTS OF ORGANISATIONS AND THEIR MEMBERS

3.1. INTRODUCTION

In the last chapter a number of writers' concepts of organisations and their members were reviewed. The concept of organisations as networks of inter-related individuals in purposive activity had most significance for the author of this study. The network was conceived as being both inter- and intra-organisational, with links between organisations mediated through boundary spanning individuals to a denser network of individuals and groups within organisations. The boundary to the network would be set by dependence in the links - in the case of this study embracing all those who are involved in highway activities in the county of Kent. Resources are exchanged through links in the network. The nodes in the network are occupied by individuals in purposive action. It was postulated that there would be multiple networks for differing systems of relationship and that these multiple networks would not necessarily be coincident.

The key to understanding behaviour in this network clearly lies in the reactions of the nodes (individuals) and the manner in which their action is influenced by their relationship with others. The first task, therefore, must be to develop a clearer understanding of the causes and meaning of individual action. The second task is then to consider the influence of single network links (relationships) on that action. The third stage must be to extend the conceptualisation to embrace the influence of the full organisation network. Finally the consideration must be widened again to include the wider network of the organisation's environment.

But to be relevant to this study of individual engineer's experience of professional life in a changing environment, we must maintain our focus on individuals - individual action; individuals in interaction with others; individuals in the network of relationships in their organisation, and individuals influenced directly and indirectly by the larger network of that organisation's environment.

This emphasis on the activity of individuals as the occupant of nodes in the network will enable the study to take a middle course between the extremes of the systems and action approach to organisations.

"The Systems approach tends to regard behaviour as a reflection of the characteristics of a social system containing a series of impersonal processes which are external to actions and constrain them. In emphasising that action derives from the meaning that men attach to their own and each other's acts the Action frame of reference argues that man is constrained by the way in which he socially constructs his reality". (Silverman 1970, p.141).

It would seem that a network concept should be able to encompass both meaningful, purposeful individual action, and the reality of the network of others (however much they are for convenience assembled into groups and organisations) who at once constrain and facilitate that action.

A network concept must be integrative, since it ties individual activity into groups, organisations, and inter-organisational sets. Similarly, from an action frame of reference, Bowey (1976) considers larger scale phenomena than the "meaningful action" of individuals. Although concern for individual action (rather than merely behaviour) is the major emphasis of action theory, Bowey adds four further axioms

to amplify the concept.

First she propounds a "role axiom" by which roles are viewed as individuals' interpretation of the behaviour of themselves and others as coherent patterns of meaningful action derived from attitudes and objectives. Her second axiom is that of "relationship" by which roles are perceived for others, leading to patterned interaction as long as those perceptions persist. This leads to the third level, a "structure axiom" by which patterned inter-actions, persisting over time, become identified as a transitory structure. The patterned actions of actors are not only influenced by the objectives and interventions of others but also by the impact of the environment. Finally she suggests a "process axiom" to explain organisational and environmental change. These four axioms, together with the basic concern of action theory for meaningful action by individuals, represent five steps in the aggregation of individual "meaningful action" into organisational process. Because of her concern with social structures, there is an element of voluntarism in her approach that may be in conflict with the formal rules, sanctions, and contractual relationships in local government organisations. However, our concern with the perceptions of those with highway responsibilities in local government during a period of change makes her concepts germane to this study, though needing to be balanced by a structural approach to the environment.

In building up conceptualisation from the activity of nodes, to interdependence in the links, to the integration of activity in organisations, to relationships in the larger inter-organisational network, we will endeavour to maintain a balance between the abstract conceptualisation of individual decisions and network structures and the concrete activity of the participants.

3.2. THE NODES OF THE NETWORK: INDIVIDUALS IN ACTION

Since we are concerned with individuals engaged in activity which they believe to be purposeful, we will take it that their actions are motivated and have objectives. In the last chapter it was suggested that an individual's motives could be grouped into three sets and could be considered as lying in three orthogonal axes. The sets were called economic, social and achievement motives. It was also suggested that V.H. Vroom's mathematical expression of expectancy theory offered an opportunity to bring greater clarity to the assessments an individual makes in deciding on action in pursuit of objectives. Motives and goal directed behaviour are generally taken as two separate topics or questions.

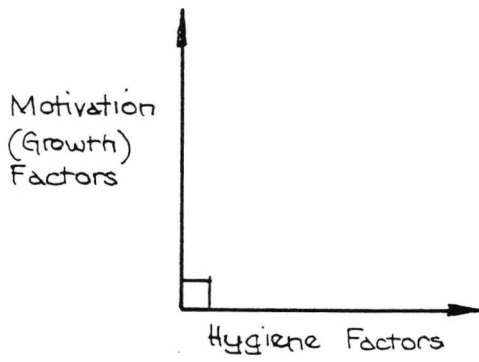
"One of these is the question of the arousal or energising of the organism. Why is the organism active at all? What conditions instigate action, determine its duration or persistence and finally its cessation? The phenomena to be explained include the level of activity of the organism and the vigour of amplitude of its behaviour. The second question involves the direction of behaviour. What determines the form that activity will take? Under what conditions will an organism choose one response or another or move in one direction or another? The problem is to explain the choices made by an organism among qualitatively different behaviours". (Vroom 1961, p. 8).

We would hope to combine these two topics into one "motivational calculus" (1), building up a means-ends chain between motives and goals. We start from a three dimensional view of individual motivation.

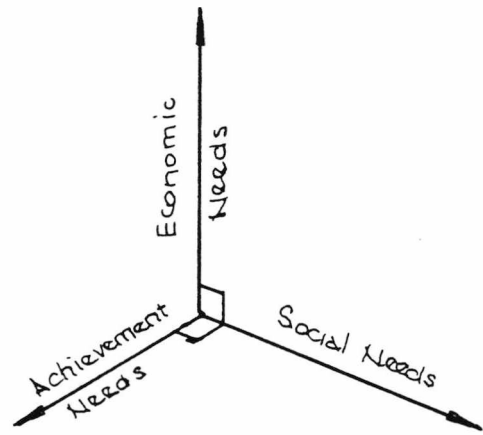
3.2.1. A three-dimensional motivation model

If man is motivated by his needs, then some order must be brought into the varying categories of needs examined in the last chapter. It was suggested that they could be grouped into three sets: economic, social and achievement needs; and that these three sets could be visualised as lying in three dimensions at right angles. This concept grew from a consideration of Herzberg's (1966) findings regarding the apparent independence of achievement factors ("motivators") from economic ("hygiene") factors in relation to job satisfaction. Herzberg's concept of job satisfaction is not fully defined, but it would appear that his results are compatible with satisfaction of achievement needs being independent of satisfaction of economic needs. It was therefore suggested in the last chapter that achievement needs and economic needs might be represented by two vectors at right angles such that change in one vector had no effect on the vector in the other axis. (Fig. 3.1a). If an individual has strongly developed achievement needs then no amount of change in the economic axis will bring relief, and hence a sense of job satisfaction, in the other.

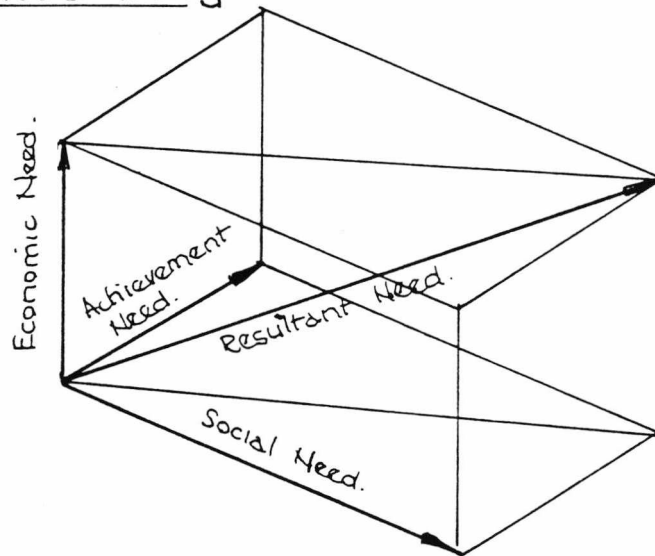
Extending this concept to include the third group, social needs, leads one to suggest a three dimensional model (Fig. 3.1b) in which economic, social, and achievement needs lie along three orthogonal axes. The length of each of the needs vectors indicates the intensity and relative potency of that need. The three vectors can be resolved into a single resultant inclined to the three axes (Fig. 3.1c). We will refer to the resultant as the individual's motivation; reflecting as it does the balance of his three sets of needs. Change in the balance of needs will alter the magnitude and direction of the resultant motivation.



a) 2-Dimensional Representation of Herzberg's 2-Factor Theory



b) 3-Dimensional Needs Model



c) Resultant of 3-Dimensional Needs

FIG 3-1 DEVELOPMENT OF 3-DIMENSIONAL NEEDS MODEL

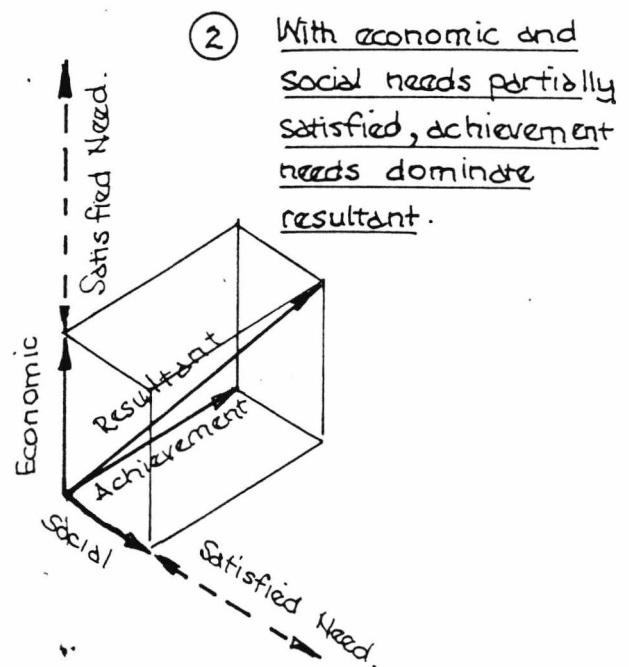
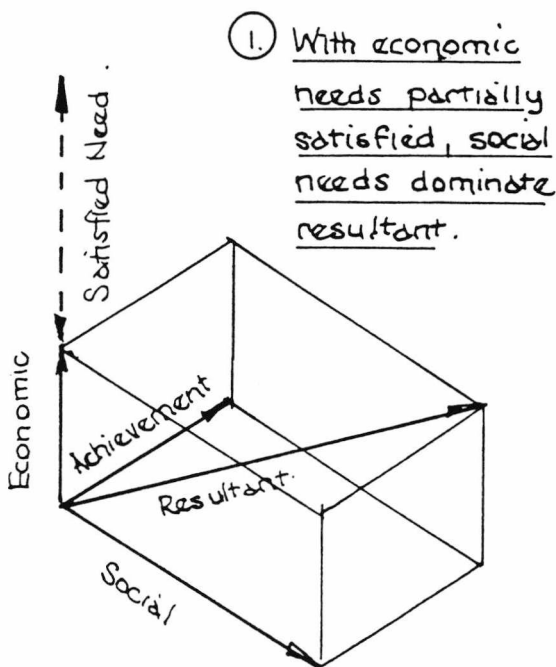


FIG 3-2 HIERARCHY OF NEEDS SATISFACTION

A hierarchy of needs such as that postulated by Maslow is compatible with this graphical concept (Fig. 3.2). With no needs satisfied let us assume that economic needs are the most potent, followed by social needs and then achievement needs. The resultant motivation will lie close to the economic axis. As economic needs are met, the economic vector will shorten, while the social vector (either unchanged or lengthening as aspirations rise) will have the principal influence on the resultant motivation. With social needs becoming satisfied, the social vector will shorten, and the achievement needs will have the dominant influence on the alignment of the resultant motivation. The relative dominance of the three needs vectors is dependent upon the individual's own disposition, priorities and values, and this will determine the order of the hierarchy. Since early environment, education and later experience all influence values and priorities it will not be possible to anticipate what that hierarchy might be for an individual. Nor will his needs be constant over time. They will change as his experience and aspirations change and one can visualise a continual process of adjustment among the three vectors and their resultants.

The individual's needs will govern his choice among a perceived set of possible goals and these goals will determine his decisions and actions. We have seen that Simon defined motives as "causes that lead individuals to select specific goals rather than others" and goals as "value premises serving an input to decisions" (1964, p.3). The resultant will be parallel to the resultant motivation and will have projections onto three orthogonal goal axes corresponding to the three needs axes. These will be the individual's economic, social and achievement goals. Because we are dealing with his basic needs these goals will be generalised and, one might assume from one's own

experience, quite abstract. The goals will be realised however by a means-ends chain of lower order goals. Thus, earning a specific bonus might be a means towards achieving economic goals, dinner with friends a means towards social goals, and a successfully completed project a means towards achievement goals. Over time, however, we would presume that the individual would endeavour to attain a resultant means-ends chain that ran along the resultant goal vector to ensure that his basic motivation was satisfied.

The higher goals along the means-ends chains are, as Simon stated, value premises for decisions. Decisions will initiate action at lower points in the means-ends chains. We can conceive of the individual selecting a portfolio of actions which, together, contribute towards the achievement of his resultant goal. Again the goal will be influenced by the person's experience and expectations, and by his assessment of his own capacity and place in society, and the resources and constraints of his environment. These factors will determine what means and ends suggest themselves to the person and what decisions he arrives at among the alternatives available to him. But a goal is not only an objective; it is also a constraint. It sets bounds to individual activity. There must be bounds in each goal dimension which together define a three-dimensional "action space" for him. Healy and Underwood (1978) had a similar concept when, in the planning environment, they defined an individual's action space as "that sphere of action within which an individual has, or claims to have, power to impose his definition of appropriate action and hence to influence how decisions are made". Because the individual's private action space is bounded by his own goals, expectation, and self-assessment the boundaries must be flexible and changing and, of course, constrained by the influence of others (2).

So the sequence we have postulated in this section moves from individual needs in three dimensions to a resultant motivation and this, in turn, is related to a resultant high level goal. The resultant goal has social, economic and achievement components and individuals seek to achieve these goals by activity in means-ends chains, with opportunities for action bounded by a three-dimensional action space. The sequence motive-action-goal achievement links Vroom's two questions of the origin and direction of behaviour, and we have endeavoured to give shape to concepts of motives, goals and goal-directed behaviour. We must now clarify the factors influencing decisions in the means-ends chains.

3.2.2. Expectancy and individual decisions

The actions an individual selects within his action space are expected by him to be a rational means towards his goals. Expectancy theory is one of a class of similar theories based on the concept that the strength of a tendency to act in a certain way depends on the strength of his belief, opinion, or expectancy that the act will be followed by a given consequence (or outcome) and on the value that the individual attributes to that consequence. This cognitive approach has generally been employed in the examination of individual performance in the working environment (3). To the writer, however, there seems no reason why the same concepts should not be applied to a wider range of choice behaviour where both act and outcome are elements of a means-ends chain, and the value of the outcome relates to the contribution it makes to the achievement of the individual's multi-dimensional goals.

Vroom (1964) developed his formulation of the expectancy model from earlier work by economists and psychologists in the field of choice behaviour. Wabba and House (1974) considered that expectancy or

instrumentality-valence theory was at that time the most widely accepted theory of work and motivation among organisational psychologists. The term "valence" was used by Vroom to indicate the strength of an individual's preference for some outcome. Thus an outcome is positively valent when a person prefers attaining it to not doing so, is zero when he is indifferent to it and negative when he prefers to avoid it. Vroom formulates two propositions. First that "the force on a person to perform an act is a monotonically increasing function of the algebraic sum of the product of the valence of all outcomes and the strength of his expectancies that the act will be followed by the attainment of the outcomes" (1964, p.18). This may be expressed mathematically (4) as:-

$$F_i = f \left[\sum_{j=1}^n (E_{ij} v_j) \right] \dots\dots\dots (1)$$

where: F_i is the force, or motivation to perform act i

f is a function

j is the set of n possible outcomes of action i

E_{ij} is the strength of the expectancy that act i will be followed by outcome j

v_j is the valence of first level outcome j

The second proposition is that "the valence of an outcome to a person is a monotonically increasing function of the algebraic sum of the products of the valences of all other outcomes and his conception of its instrumentality for the attainment of these other outcomes" (p.17). In equation form this proposition reads:

$$v_j = f \left[\sum_{k=1}^n (v_k I_{jk}) \right] \dots\dots\dots (2)$$

where: I_{jk} is the cognized instrumentality of outcome j for the attainment of second level outcome k.

Vroom points out that expectancy is an action-outcome association ranging from zero (no probability) to 1 (certainty). Instrumentality is an outcome-outcome association ranging from -1 to +1.

Much research into expectancy theory has centred round its ability to predict performance in relation to rewards and motivation. Mitchell in his review article (1979) shows that correlation has proved unreliable when tested across a number of subjects. Within-subject tests, however, gave considerable support to expectancy theory, particularly when the number of outcomes was limited, or generated by the subjects themselves. Within-subject tests are more compatible with Vroom's formulation than across subject investigations since he was concerned with choice behaviour by single individuals.

Campbell et al (1970) broke the expectancy component of equation (1) into two. Thus Expectancy 1 relates to the strength of the expectancy that an effort will result in performance i (i.e. the attainment of task goals) and Expectancy 2 to the expectancy that performance i will achieve reward or outcome j. Instrumentality relates reward j to the attainment of desired further outcome k. This is a rather different approach, with the individual motivated to select a level of effort leading to a specific act as a prelude to the act itself. It could be equated with Vroom's formulation by making the level of effort equal act i, the performance equal outcome j, and the reward outcome k. Clearly one may extend the means-ends chain of action and outcome, with expectancies linking actions and outcomes at the "means" end of the chain and instrumentalities linking outcome and outcome at the "ends" end of the chain. Can we legitimately extend the Vroom formulation to embrace the whole means-ends chain from action to high level outcome or goal? It must be accepted that there will be a number of steps in the chain between "outcome j" and the individual's

economic, social and achievement goals and that the perceived instrumentality of that outcome for goal attainment will be dependent on his experience, abilities and values. Also that there will be innumerable trivial decisions which are remote from his ultimate goals. However these decisions are primarily associated with the maintenance of the status quo rather than significant steps towards valued ends.

Providing actions, outcomes, and expectations are taken to be incremental parts of a chain from the adopting of a course of action to the attainment of specific higher order goals there appears to be no reason why the "outcome k" may not be taken to be the individual's immediate social, economic and achievement goals. Then if act i is expected to lead to a single outcome j which is perceived to be an instrumental means to the attainment of those higher order goals, we may rephrase expressions 1 and 2 thus:-

$$F_i = f(E_{ij}v_j) \quad v_j = f[V_e I_{je} + V_s I_{js} + V_a I_{ja}]$$

therefore $F_i = f(E_{ij} [V_e I_{je} + V_s I_{js} + V_a I_{ja}]) \dots\dots\dots (3)$

where: F_i is the force or motivation to take action i

f is a function

E_{ij} is the strength of the expectancy that act i will achieve outcome j

v_j is the valence of outcome j

V_e, V_s, V_a are the valences of economic, social and achievement goals for the individual

I_{je}, I_{js} and I_{ja} are the instrumentalities of outcome j for the attainment of economic, social and achievement goals for the individual.

The value of this reformulation is that outcome j can be either a physical end product, or an extrinsic or intrinsic reward. In addition a potentially wide range of outcome-outcome alternatives and steps is collapsed into the three perceived instrumentalities for ultimate goal

satisfaction.

One may postulate that extrinsic rewards will relate to economic or social goals, whilst intrinsic rewards will relate to achievement (self actualising) goals since these are not mediated by others. Thus Turney (1974) took intrinsic value to be the pleasure experienced by an employee in carrying out the task or activity - his intrinsic activity value (IAV). Since this value relates to task performance it must arise between the effort "input" and task accomplishment. House (1971) conceives the motivation to work as a path-goal appraisal and includes both the intrinsic value associated with goal-directed behaviour and the intrinsic valence of work-goal accomplishment in his formulation. Clearly intrinsic value, and hence achievement needs satisfaction can arise at a number of points along the effort-performance-outcome means-ends chain. A single course of action may assist in achieving economic, social and achievement goals at varying stages along the chain. The valences in Expression 3 above are those associated with the achievement of a person's economic, social and achievement goals. Other outcomes will have an inferior value to him, and he will accordingly orientate his action along a path which he believes to be the most effective for goal achievement. We can envisage that in fact there would be a scatter of activity about that path, which is the means-ends chain to his ultimate objectives. It is therefore akin to the resultant goal vector of the previous section. That three dimensional model of motives and goals and the cognitive approach of this section are complementary. One builds up a concept of a three-dimensional action space, the other identifies factors influencing the direction of rational action within that space. Indeed one could suggest that instrumentalities (of the chosen portfolio of actions for goal achievement) in the cognitive formulation approximate to the

inclination of the goal resultant to the three goal axis in the first model.

But these abstract models must adapt to the unpredictability of "meaningful action" by real persons. There is nothing absolute about the values, expectancies and instrumentalities determining preferred action. They must differ from person to person, and from time to time in a person's life. This is psychologists' territory and it would be presumptuous to trespass too far into this field. However we must give some consideration to the influence a professional orientation might have on the critical factors referred to above - and how these in turn could be influenced by change.

3.2.3. Individual professionals in a time of change

Needs, motives, goals, values, expectancies, and instrumentalities are the vocabulary of the concepts developed so far in this chapter. Values (and goals as valued outcomes), expectancies, and instrumentalities give meaning to the individual's action space and will be directly influenced by professional training and experience. Needs (and resultant motivation) have more complex sources - both biological and social - and for the purpose of this study must be taken as "givens". What motivates people is not as relevant to understanding people's behaviour and reaction to change as the process by which they resolve the conflicting or complementary objectives they have for themselves and the environment they inhabit. In this process of resolution we have identified values, expectancies, and instrumentalities as being key factors. Because the range of decision making in the working environment is only a sub-set of the total range a person spans in his daily existence, and we are dealing with a specific group of professionals - highway engineers - it is possible to make some tentative generalisations.

Engineers have acquired a systematic body of knowledge in the course of their training, generally through a three or four year period of study at university. Because they are dealing with inanimate matter and applying the fruits of scientific research rather than embarking on that research itself, they are trained in assumed certainties (if A then B for all practical purposes). The expectation of their work at the "means" (factual) end of the chain is therefore high within their professional competence. Instrumentalities at the "ends" (value) end of the chain they learn by experience and acquire by socialisation.

Barber (1963) draws attention to the function of universities in the ethical training of students as well as in the transmission of generalised and systematic knowledge. The ethics of the professional's orientation to the community (5) is rarely explicit in an engineer's training but is implicit in lecturer's attitudes, and in the search for efficiency and optimisation. Thus if an engineer is to acquire the service ethic of the traditional professionals, and the specific values of his chosen profession, he must do so through socialisation rather than direct instruction. Otherwise he will be part of that "explosion of experts and technocrats - men of narrow specialising and narrower vision" which Wright Mills feared (see Johnson 1972, p.16). Merton (1947) singled out engineers as having "a trained incapacity for thinking about and dealing with human affairs". But this must result from a failure of his socialisation at college and in the early years of his career to imbue him with the traditional professional values and perceptions of instrumentalities. Alternatively it may be that his early training and subsequent experience have prescribed too tightly his concepts of the area of his profession's special competence.

The difficulty is to separate instrumentalities from values. Failure to identify, let us say, the social implications of building a

motorway through a built-up area may result from failure to take account of a sufficiently wide range of instrumentalities rather than indifference to social values. It has been a significant experience for engineers engaged in public participation exercises for road schemes to be brought face to face with those for whom roadworks have negatively valent outcomes. (6). The instrumentality of action for realisation of achievement goals may be expected to be very much more apparent to engineers assuming that they do, in fact, find satisfaction in physical end results rather than in social relationships. Gerstl and Hutton investigated the extent of individuals' dedication to their work and found that engineers intrinsic work satisfaction was high independently of their relationship with others (that is independently of social needs). "Workmanship" or "craftsmanship" - the satisfaction of creating something permanent and real - were frequently reported sources of job satisfaction (1966, p.119). Similarly Perucci and Gerstl (1969) found engineers valued challenge most highly among six factors associated with their work.

Engineers' perception of the instrumentality of certain aspects of their work for the attainment of achievement goals is therefore clear-cut. Indeed, as House (1971) observes, the instrumentality of activity which is intrinsically valent (in this context, contributes to achievement goals) may be expected to be nearly unity (because the return is self-generated and hence independent of others). A self employed engineer will also be acutely aware of the extent to which his work is instrumental to attainment of his economic goals. A successful project for a client or one meeting the approval of his peers may lead to other commissions, though there may be a conflict between the criteria of success used by the client, and his own criteria of success in the achievement dimension. For those employed by organisations the

link is not so direct but failure to work well still carries with it the threat of dismissal and economic hardship. Good performance may justify promotion and enhanced economic prospects. In these circumstances activity may be seen as contributing to goal maintenance rather than higher goal achievement. Perhaps satisficing may be more important for economic goals, whilst a higher level is sought for the satisfaction of achievement goals?

One might therefore postulate that expectations of the immediate outcome of engineering activity will be high, and that economic and achievement goal instrumentalities will be clearly apparent (though economic instrumentalities may be less apparent in a time of contraction). Indeed the relative certainty of much engineering work might be taken to indicate that those choosing this profession have a low tolerance to uncertainty. The social instrumentalities and implications of their work were traditionally less well perceived (vide Merton above) but this will depend on the perceived social values of their working environment.

Values and the "assumptive world" (Young 1977) of an engineer, embracing as they do his beliefs, evaluations and commitments are again the product of accumulated knowledge of himself and the world. Because values are maintained by inter-action between individuals and their environment they will be influenced by change in that environment, and those who populate it. However change in his assumptive world may only be at the superficial level. Young suggests a hierarchy of values and responses. He argues that while opinions change, and attitudes may change, ideologies are almost immutable.

Change in the individual's environment will affect values and perceptions of expectancy and instrumentalities. Generalising one may

suggest that the principal influences will be change in the resources available to him, and change in his interdependence with others. Change in resources (of information, finance, authority, or facilities) will influence his ability to achieve an outcome, or his perception of the instrumentality of action for the achievement of valued goals. Thus shortage of funds may inhibit a highway maintenance engineer's ability to provide a desired level of service, while information on the performance of road building materials may alter his assessment of their utility for extending the life of highways.

Dependence on others may alter his expectancy that his actions will achieve a particular outcome. Change in relationships and resources (i.e. in the social and economic dimensions) may, over time, influence his values - or at least his valuation of action outcomes. The level of outcome will relate to his readiness to change in this respect. Low level outcomes are a matter of opinion; the assessment of higher level outcomes is dependent on attitudes, and accordingly less subject to change; high level outcomes relate to ultimate goals and ideologies and (after Young, above) these values are almost immutable.

The individual may adapt his low level valuations (opinions) in order to protect and maintain the structure of his overall beliefs (ideologies) and acquired skills. Thus a highway engineer may convince himself that a hitherto rejected solution is acceptable for an improvement scheme in order that the impact on the (changing) social acceptability and credence of his work may not suffer. Change in his achievement goals may be more lasting over time, as he moves from technical to managerial responsibilities during a normal career progression. Since research indicates that engineers place a high

value on achievement goals one may expect them to be particularly aware of changes which influence their autonomy and job satisfaction - both of which are essential elements of the set of goals we have identified as being in the achievement axis. Changes of this nature are mediated through others.

Having, therefore, considered the factors influencing individual actions, and related those to the particular group of individuals forming the subject of this study, we must move on to consider how those actions are influenced by others. Reverting to the network concept; we have considered what determines the activity of single nodes: we must now consider the influence of the links.

3.3. LINKS BETWEEN NODES: RELATIONSHIPS BETWEEN INDIVIDUALS

In this section we will consider the interaction of two individuals who enter into some form of voluntary relationship. In the following section we will consider the more formal relationships, or linkages, within organisations. Inherent in the idea of relationship is some form of exchange - of friendship, support, information, or ideas. We may conceive this as an exchange of the resources required by the two participants in the relationship to meet their needs and goals. "Actors enter into relationships with other actors through the exchange of certain resources which help them to meet certain of their functional needs" wrote Galaskiewicz (1979, p.21), and proceeded to identify three types of transaction: exchange of money to satisfy adaptive needs; of moral support to satisfy legitimacy needs, and of information to satisfy problem solving needs. At a superficial level these equate readily with the three dimensional economic, social and achievement needs (respectively) referred to earlier in this chapter. More generally, however, the functional needs identified by

Galaskiewicz will be instrumental needs facilitating the realisation of a number of higher order goals (for example the need to acquire money to satisfy economic needs, for social use, or as a surrogate for achievement needs).

So we can picture the interchange taking place along the three dimensions of the individual's goal set. Boisserain (1974) suggests that the interaction between two people is governed by the principle that the value each gains from the interaction must be equal to or greater than the cost to them over some time scale. (Alternatively one may look upon it as an investment against future gain). However this does not imply that the interchange must be symmetrical. Clearly there is a measure of asymmetry in many relationships, resulting in dependence of one on the other, particularly where one individual possesses monopoly power over a resource needed by the other.

How do exchange relationships of this nature influence an individual's action space and cognition? We must consider whether the concepts developed in the last section can be extended to include two individuals with some form of voluntary linkage between them. We picture the individuals as two nodes, and the link as an interchange of economic, social or achievement need satisfying resources between them.

3.3.1. Relationships and an individual's action space

An individual's action space was pictured in 3.2.1 above as being bounded by his three dimensional goals and values. His action space would then be defined as that sphere of action within which he has, or claims to have, power to impose his definition of appropriate action and to determine how decisions are made. If now two people decide to interact in pursuit of their respective goals there must be an intersection of their action spaces. The intersecting portion is that

sphere of action within which the participants share appropriate action and the determination of how decisions are made.

If the relationship involves simply an interchange of economic resources the overlap will be on the economic goal axis. A developing friendship would indicate an intersection on the social axis. A meeting of minds leading to higher academic achievement or competitive rivalry acting as a stimulus to better performance would be represented by an intersection in action space along the achievement axis. More generally one would expect there to be overlap in more than one axis. In Figure 3.3 an attempt is made to represent two action spaces with overlap in the economic axis - perhaps an exchange of food for money. If the exchange is symmetrical both participants will derive the same value from the interchange, and both sets of goals will be facilitated to the same extent. If the exchange is asymmetrical but must necessarily be engaged in by both participants one will derive less value from the interchange than the other, and his action space will be diminished by the difference. If he derives no value from the interchange then his action space is reduced by the full extent of the overlap. This will be partly a matter of perception. One need only compare two participants report of a relationship, "I'm his partner/he's one of my suppliers", or "he's my best friend/he's an acquaintance of mine", to see how the meaning of the overlapping action space can differ. Also one may derive value from an overlap in one axis, the other from another axis. Because the boundaries of a person's action space are continuously adjusting, an interchange of this nature can also expand his action space as contact with the other person extends his ambition and expectations.

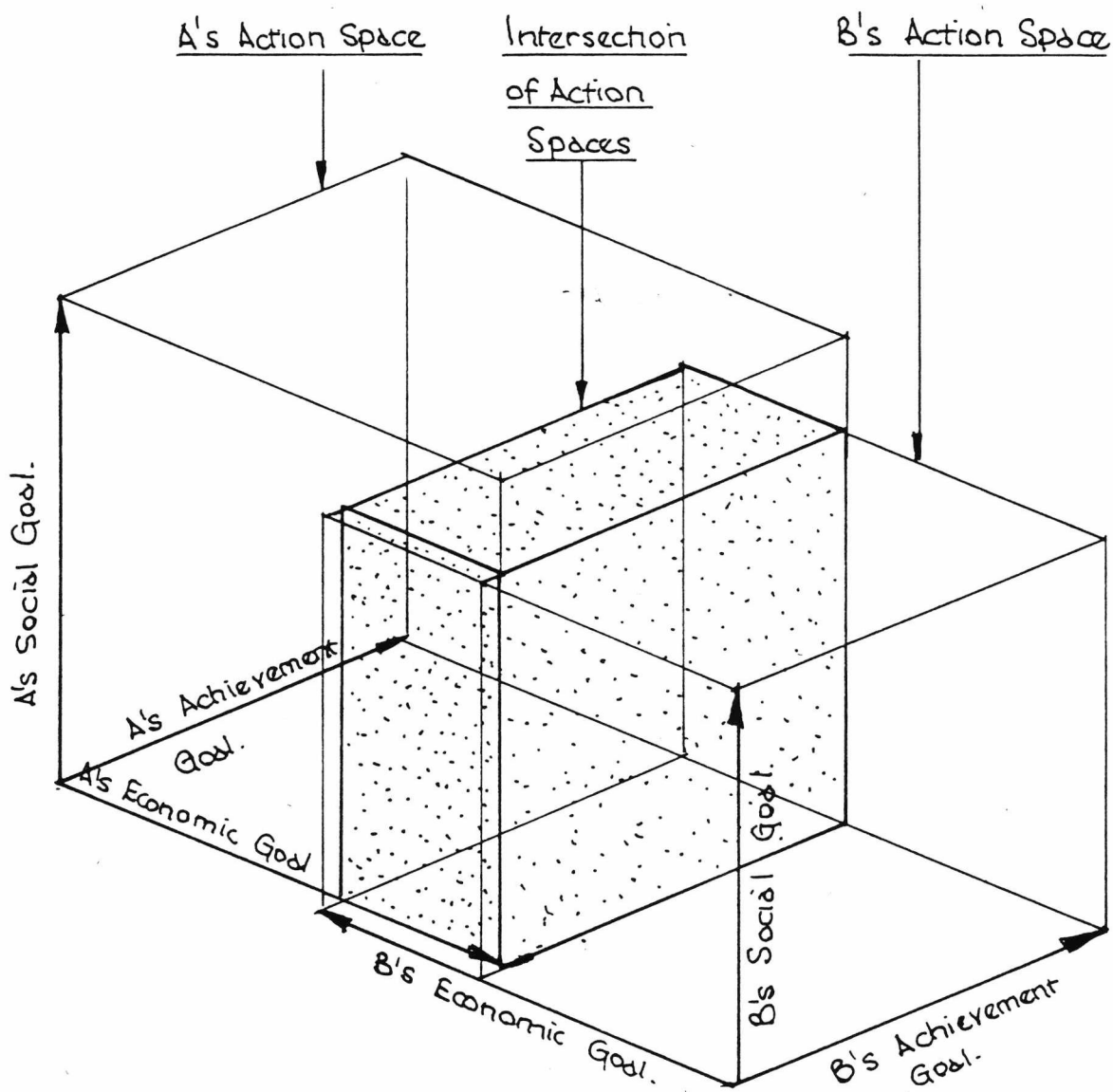


FIG 3-3 INTERSECTION OF 2 INDIVIDUALS' ACTION SPACES

Let us extend the consideration of the intersection of action spaces to embrace the concept of roles and shared goals. Clyde Mitchell (1969) considered roles to be the behaviour an individual expects the other to take in the light of the linkage between them, and the meaning they each attribute to that link. In contrast with this structural view, Bowey (1976) from her action viewpoint looked upon roles as the interpretation individuals make of themselves and others as coherent patterns of meaningful action derived from their attitudes and objectives. From both points of view an interchange of economic resources would result in the participants perceiving economic roles for each other, just as a social relationship would be seen as the adoption of social roles. Because interaction occurs in this action space intersection, roles are defined by the overlap, and the differing concepts of the "sent" and "received" roles (7) will be related to the differing perceptions of the extent and value of the overlap. This should not obscure the fact that the degree of overlap in action spaces is also dependent on the roles assumed by the participants.

For both participants the interaction facilitates the achievement of one or more of their multi-dimensional goals. This it may do by increasing expectancies and instrumentalities. Generally the participants will have a shared interest in reducing uncertainties and increasing expectancies through a stable and congenial relationship - particularly if they interact as equals. One might say that in such a relationship the participants negotiate a shared "assumptive world". The central issue in some situations may be to contest and/or settle expectations about each other's roles.

If the relationship is instrumental to goal achievement then it becomes one of the links in a means-ends chain. The more valuable the

exchange, and the higher its instrumentality, the more of the means-end chain between need and goal it occupies, and the more the goal of the individual becomes the goal of the interchange. Thus the individual goals become "identified" with the common goal. More normally the object or goal of the relationship will be a smaller shared element of the two individuals' separate goal achieving chains. As we have seen, the value may not be the same to both participants so that the meaning (in a means-ends sense) for the two may not be the same: for one it represents a more significant link in the means-ends chain than for the other. Thus individual goals and the goals of the relationship must be separate, yet are interdependent. This consideration of the elements of the means-ends sequence for goal achievement must now be examined from a cognitive viewpoint.

3.3.2. Expectancy and inter-dependent decision making

We are interested in two individuals' decision-making in the intersecting portion of their action spaces. Although for clarity we have indicated this overlap towards the "ends" (value) end of their means-ends goal vectors in Figure 3.3, the interaction will in fact probably be towards the "means" (factual) end of the chain where action-outcome decisions are made. In this overlap there is interaction and hence interdependent decision making. The assumption is that the value each derives from the interaction is greater than its cost to them. One concept of the cost would be the most highly valued individual action or outcome foregone in order that the interaction may occur - the opportunity cost of the interaction.

Let us consider two courses of action open to an individual, one action g with outcome h and the other, action i with outcome j . Both outcomes h and j have instrumentality for the attainment of A 's



personal goals. If, without the involvement of actor B, actor A would feel impelled or motivated to take action g:-

$$F_g > F_i$$

And therefore from Expression 3:

$$f(E_{gh} [V_e I_{he} + V_s I_{hs} + V_a I_{ha}]) > f(E_{ij} [V_e I_{je} + V_s I_{js} + V_a I_{ja}]) \dots\dots(4)$$

where the notation on the right hand side is as for Expression 3 and:

E_{gh} is the strength of the expectancy that act g will have outcome h

I_{he} , I_{hs} , I_{ha} are the instrumentality of outcome h for the attainment of A's economic, social and achievement goals

V_e , V_s , V_a are the valences of those goals to the individual.

Let us suppose that the intervention of actor B results in actor A deciding to take action i instead of action g. Then the involvement of B has increased the magnitude of F_i on A until it is greater than F_g . This could result from a number of factors. First the involvement of B may have increased A's expectancy that act i will in fact be followed by outcome j. He may have attempted act i in the past without success and B may give him the confidence and assistance he requires to make the outcome j a near certainty. Second B may have increased A's perception of the instrumentality of j for the achievement of his goals. This could be because of the promised continual involvement of B, or because of his advice or resources (8). Finally B may have changed A's values, so that valences V_e , V_s or V_a are changed. This is likely to be a longer term change in A's attitudes marking a modification to his "assumptive world" and consequently to the bounds of his action space (as a result of his insight into B's values and objectives).

In addition to these adjustments, B may be able to encourage A to take the desired action i by offering him a direct incentive x of value V_x . Then if this is sufficient to encourage A to take action i instead of g (without other changes in his perception) Expression 4 becomes:

$$f(E_{ij}[V_e I_{je} + V_s I_{js} + V_a I_{ja} + V_x I_{jx}]) > f(E_{gh}[V_e I_{he} + V_s I_{hs} + V_a I_{ha}] \dots\dots(5)$$

V_x could be an intrinsic value, in which case I_{jx} is unity, or else an extrinsic value, in which case I_{jx} will depend on his perception of B's dependability and ability to produce the incentive. If, of course, x is a penalty which B threatens to impose, then its valence is negative and A's desire will be to avoid it, making its instrumentality negative also. The more the value of x becomes intrinsic, the more A's identification with act i. Indeed if A discounts his own economic, social and achievement goals and is principally influenced by the valence of x one could say that A has become "identified with goal x" - the achievement of which would dominate his action space.

If both A and B have to modify their intended actions because of the benefit they see in working together - or if together they can achieve an outcome which neither could achieve individually - then the force on both of them to take joint action is greater than that for alternative individual action, and the first level outcome of their actions is their common goal. If they differ on which joint action to take, a measure of compromise is necessary and both will "satisfice" rather than optimise their goal achievement in that instance. The more perceptions are shared the easier it will be to come to a compromise and the longer their "patterned interaction" will persist. Professionals may be expected to share a range of values, yet disagreements proliferate. We must consider why this should be.

3.3.3. Professionals in partnership

We have seen above (3.2.3) that professionals, in our case engineers, have a systematic body of specialised knowledge, claim commitment to the community (9) and have high achievement needs. Since achievement needs are ultimately differentiating rather than integrative, this third set of needs shows itself in a desire for autonomy in their work. This is not to deny that the means towards that end may involve collective action (as in an orchestra or project team).

If two engineers come together in the short or long term to work in partnership they are dependent on each other, in part at least, for goal achievement. They depend on each other for the commercial credibility of their joint product or service, and hence for the achievement and safeguarding of their economic goals. They will generally find some social satisfaction in their association but it is in the interchange of information and opinion, primarily relating to achievement goals (though obviously having instrumental value in their joint operations) that the viability and uniqueness of the partnership will depend. The more unique the knowledge of the partner the greater the standing of the partnership and the more dependent the one is on the other. Disagreements can be correspondingly intense.

The action-outcome sequence for engineers is generally predictable and uncontentious. Producing a design and a set of drawings will eventually result in, say, a roundabout at a certain road junction. This is virtually a factual judgement (see Simon 1976 p.4-7). But this facility will be used by a vast number of people and the outcome-outcome sequence is far from predictable, even after the event. There can, therefore, be arguments over the instrumentality of outcomes, and

the value of outcomes. Because of the degree of commitment of engineers to the task in hand - the product, rather than to the eventual use of that product - a challenge to its value can be seen as a personal affront, particularly when evaluation is by professional peers. So while a partner's information may be accepted as being instrumental to a first level outcome, the instrumentality of that first level outcome to higher level outcomes may be in dispute - putting a strain on the partnership.

On entering into a partnership a measure of autonomy, and hence potentially of achievement needs satisfaction (given an ideology of individual achievement) is lost, but lower level instrumentalities are gained and expectancies are correspondingly increased. Perceptions of higher level instrumentalities (for example that roundabouts in similar locations have been found to be hazardous) may be changed and so too may values.

Accepting a compromise means accepting a lower valued first level outcome to action within the overlapping action space (partnership) in order to maintain the relationship. Thus the loss of potential value within one link of the means-ends chain is accepted because of the benefit afforded by continuing the partnership. To avoid placing the partnership in jeopardy every time there are strains of this nature, or changes in the environment alter the premises of decisions, a range of contracts (from the implicit to the legal) are entered into. This increases the cost of breaking the relationship and subjects it to an impersonal authority. It therefore begins to take on the characteristics of relationships within organisation.

3.4. NODES AND LINKS IN A NETWORK: INDIVIDUALS IN ORGANISATIONS

We have now considered the "meaningful action" of individuals (nodes) and the "patterned interaction" of individuals in voluntary relationships with others (links). We must now consider what additional factors influence individual activity when the links are built up within a formally established organisation. At the beginning of Chapter 2 Schein's preliminary definition of an organisation as the "planned coordination of the activities of a number of people for the achievement of some common, explicit purpose or goal through the division of labour and function, and through a hierarchy of authority and responsibility" was quoted (1980, p.15). Although he proceeds to elaborate this definition, there is no doubt that it expresses the intention of those who establish and manage the majority of bureaucratic organisations. It may not be what organisations are: it is certainly what management intends them to be.

As a result, the links constraining and facilitating the actions of those who have taken employment in organisation are different from those in a voluntary interaction of two individuals, and the range of activity is different. Through the network of links surrounding them, individuals are controlled, coordinated, and supplied so that their particular elements of labour and responsibility contribute effectively to the organisation purpose or goal. These individual and particular "means" are so managed that they contribute to the effective achievement of the organisation's "ends." So the organisation is intended to be functionally rational. If the organisation is functionally rational then the interaction in the links will be substantially rational. Diesing (1962) distinguishes between these two levels of rationality and identifies five types of rationality which may, within these levels, be manifested in administrative behaviour.

Diesing claimed to have identified the five types as underlying enduring cultural traits in society. Technical progress is such a trend and relates to technical rationality. In the same way he identifies economic, legal, social and political rationality as having near universality. (See Hartwig 1978 p.166).

Technical rationality is the rationale or logic of technical efficiency. A technically rational process is one in which each activity makes the optimum contribution to a production sequence, resulting in the achievement of a given goal. Closely associated with it is economic rationality which is also concerned with ends and means. It involves the evaluation and selection of ends, and it occurs when two or more ends are in competition with each other for limited resources.

Legal rationality underpins the organisational context of technical and economic rationality. Its concern is with the fundamental rules, regulations and practices which shape and stabilise organisations. Rules produce predictability and regulate conflicting interests. Social rationality is the rationality of social systems. An integrative trend in a social system is a trend towards rational, social organisation. Social rationality may not be so clearly goal centred, in a means-ends sense, as technical or economic rationality. Rather it is relational - concerned with how people interact and react, and thus with the management of stability, conflict and change.

The fifth type of rationality is that of political rationality, related to the maintenance and enhancement of decision making structures and the determination of goals and purposes. These may embrace both legislative and administrative bodies and form the rationale of governance and control.

So the links in an organisation may influence an individual on the basis of these five types of rationality. Would one normally be able to differentiate between the five distinct types? Hartwig (1978), who employs Diesing's concepts in relation to administrative organisations accepts that technical and economic rationality are closely related. In a technical organisation decisions are made between two technically efficient, and hence rational, solutions, on the basis of their relative economy - technically rational means to an economic end. In these circumstances it would appear legitimate to refer to a single techno-economic system. In addition political and legal rationality are closely related. The political, decision making structure is established and maintained by legally rational rules, regulations and practices. For the individuals in an organisation these two would appear to complement each other to maintain the authority system.

For the purpose of this study, therefore, we will differentiate between the techno-economic, social and authority rationality of activity. This implies that there will be an exchange of techno-economic, social and authority resources in the links (and also, as we shall see below, a similar range of goals for work activity). Some links will only carry one resource (i.e. will be a uniplex link) while others will carry more than one (i.e. will be multiplex). If we abstract each system of exchange links we will have a techno-economic network, a social network, and an authority network. Because there is interaction within these networks they may be equated with Burns's (1965) plurality of action systems referred to in the previous chapter. The activity of the individuals occupying the network nodes may then be constrained or facilitated by techno-economic, social, or authority influences, singly or combined. We may now consider the effect of these influences on the three dimensional and cognitive approaches to individual activity developed in this chapter.

3.4.1. Organisations and an individual's action space

It was suggested in 3.3.1 above that the interaction between two people could be interpreted as an intersection of their action spaces, with joint action taking place within the overlapping space. The value derived from the overlap by the two might differ, but both would perceive a net gain in value from the interaction if it were to proceed.

When an individual joins an organisation, there is a more obvious exchange in the sense that he agrees to exchange his labour for a price to relieve his economic needs - and possibly with implicit or explicit elements to the contract relating to other needs. Thus over time, as he builds up social contacts and finds satisfaction in his work, he may gain relief for his social and achievement needs also. So his action at work brings some realisation of his three sets of goals and takes place within a portion of his action space. But the organisation is made up of a number of other people with whom he is in contact throughout his working day and again we can visualise this interaction with those in his working environment as a joint overlapping of his action space. There will be an interchange of techno-economic, social and authority influence in this overlap. Techno-economic influence might well be parallel to his economic goal axis - facilitating the achievement of that goal. But it may also affect his achievement goals. Similarly authority influence may affect more than one goal. Without stretching the geometrical analogy too far we may say that the axis of the techno-economic, social and authority influences transmitted through the links in the organisational network will generally be skewed to the individual's goal axes - influencing one or more of those goals to a greater or lesser extent.

Since his activity at work takes place within the intersection of his own action space with that of his colleagues the overlapping portion is his work role. Again the value he derives from the interaction may differ from that derived by other participants. If he derives no benefit from the interaction (in a coercive situation) or suffers the frustration of one set of goals, then the overlap sterilises that portion of his action space and constricts it to the remaining portion. Both the individual and his colleagues in the organisation will have expectations of the action he will carry out in the organisation (i.e. in the organisation dominated portion of his action space) and perceptions of its value. These beliefs and perceptions inevitably differ, and from these differences arise the conflict and ambiguity inherent in the concept of roles. Kahn et al (1964) and Hunt (1967) have examined the dynamics of the interaction between the role "senders" and the focal person, and the organisational and personal factors that can influence the outcome. Clearly there is feedback and adjustment over time, which underlines the fact that the organisational overlap of the individual's action space is not fixed. Reorientation of the individual's goals to achieve more from his work, adjustment of his behaviour to fit better with his work role, or amendment of his values to correspond to those of his colleagues, can all reduce conflict and enhance his satisfaction from his working day. All those adjustments alter the shape, value and meaning of the work portion of his action space and the complementary portions of the action space of those with whom he is in contact in the organisation.

His goal for work activity will also change. In the first place it may be a link in his economic goal means-ends chain. As his commitment increases, however, the work overlap of his action space may expand to influence other axes - and he himself may reorientate to

achieve more from the work interactions and opportunities. Generalising again, one might suggest that the greater the individual's commitment to and identification with the organisation and its functions, the larger the portion of his action space that will be overlapped by the organisation and the more his goal for work activities will be parallel to his personal goal resultant. It would be interesting to explore these reflections on role and goal further but they remain abstractions, and we must now consider the rather more concrete factors which can influence individual actions in the organisationally dominated portion of his action space.

3.4.2. Expectancy and organisational decision making

In 3.3.2 above we examined how interaction with another could influence an individual's decision making so that he was motivated to take a different action to that which he would have taken on his own volition. In Expression 5 a factor was added of valence V_x which might influence this change of action. In an organisation we have seen that an individual is influenced by a range of factors which have been identified as having techno-economic, social and authority rationality. But rational action is goal directed so that an individual influenced by one or more of these three sets of factors must perceive that they give his activities some techno-economic, social or authority goals: weld that handrail; advise that client; or issue that instruction. These organisational goals may be at a relatively low level. When a person joins an organisation his decisions may simply be determined by his economic needs and a simple technical goal of so many completed parts. If he is paid by results, the first will be dependent on the second. More generally his actions will be determined by a combination of his own personal goals, and his perceptions of the goal(s) of his work activity. Then for organisational activity we can say:-

$$F_i = f (E_{ij} [V_e I_{je} + V_s I_{js} + V_a I_{ja} + V_e' I_{je'} + V_s' I_{js'} + V_a' I_{ja'}]). \quad (6)$$

where F_i is the force or motivation to carry out work activity i

f is a function

E_{ij} is the strength of the expectancy that act i will achieve outcome j

V_e, V_s, V_a are the values of the individual's economic, social and achievement goals

V_e', V_s', V_a' are the perception of the valences of the techno-economic, social and authority goals of his work activity i
 $I_{je}, I_{je'}$ etc., are the perceived instrumentalities of the outcome j for the achievement of his own and organisational goals.

This assumes rational action, but is not restricted to economic rationality. Thus the shortcomings which Argyris saw in "rational man" organisation theories (i.e. "that they exclude variables that are important to their domain" 1973 p.253) are overcome by the inclusion of social and authority rationality into the equation. On the other hand, it is a general equation and the individual may be indifferent to or unaware of a number of the factors.

Let us apply this general expression to the interactions and interdependence which build up the organisational network. Thompson (1967) considered three forms of interdependence - pooled, sequential and reciprocal. The degree of interdependence and hence influence on individual decisions, will vary for each (10).

Thompson's pooled interdependence exists when each member or unit of an organisation renders a discrete contribution to the whole and is supported by the whole. Pooled links of interdependence therefore follow down the hierarchy of the organisation, and the authority and techno-economic links (and hence networks) are virtually coincident. Workers may achieve personal economic and achievement satisfaction from their work, but they need only know the immediate organisational "ends"

of their work (low level organisational goals) which will be passed to them by their superiors in the hierarchy. Management provides the facilities to increase the perceived instrumentality of their work and the planning and control to increase their expectation of success.

The task of their immediate superior is governed by the same generalised "decision equation" (Expression 6) but in this case his action produces action by others rather than an end product. This is the development process down the hierarchy described by Dunsire (1978) by which general policy decisions are progressively "pragmatised" down the pyramid-like organisation structure. Thus each tier has a vantage point in the means-ends chain of organisation activity, perceiving a higher, more general level of organisation goals (which enter into valences V_e , V_j , and V_a , of their decision making) than the tier below them. Their task is to keep these organisational goals in view and provide the instrumentalities for those below them to provide the "means" to these ends. The more effective their management the higher the expectancy that the relevant outcomes will be achieved. Needless to say their decisions are highly dependent on their perceptions and values.

The higher the level in the organisation the stronger the perception of the overall techno-economic, social and authority goals of the organisation. Simon (1964) has described these goals as a constraint set for organisational decision-making. We could liken the aggregate "decision making equations" of the dominant elite in the organisation to this constraint set, but we have seen that aggregate organisation activity will be the sum total of a cascade of ends-means development down the organisation structure in which each succeeding tier may have increasingly concrete, lower-level, views of the goal of their activity. Activity in the organisation is determined by this

hierarchical constraint set of decision equations rather than the goal constraint set of the dominant elite. Since personal interpretations of action enter into each node's transmission "down the line" the outcome may diverge from the organisation's declared objectives.

Thompson's sequential interdependence exists when one individual or group in an organisation must act before the next can do so. Although a production sequence comes to mind, in which one individual takes a partly finished product from another, works on it, and passes it on, the concept is equally relevant to administrative and technical processes. An engineer in one group may be dependent on another for information or test results. If this service has proved reliable in the past then his expectancy of a successful outcome (E_{ij}) and his perception of the technical instrumentality of the outcome (I_{je}) may be enhanced. But he is free to make his contribution to the process in accordance with his personal views (and those of his immediate superior) of the organisational objective. He is not dependent on the views of his predecessor in the chain of development (which in this case is flowing across the organisation). Thompson found that in this form of interdependence coordination was generally by plan or programme, emphasising the impersonal nature of the transaction. Debate on the overall strategy of the sequential activity is at a higher level. Here a reciprocal exchange of views on overall objectives may take place.

Reciprocal interdependence occurs when the output of each becomes input for others - when all are to some extent mutually interdependent. Here exchanges are not one way and impersonal and participants have to share concepts of the goals of their activity. Thompson found that in these circumstances coordination was achieved by mutual adjustment - interaction, meetings and feedback. Compromise is involved - and

compromise involves value judgements. We saw in 3.3.2 how two individuals may seek a compromise. If two individuals must work together to achieve outcome j, and one prefers action h and the other action g they may reach agreement on action i by mutual adjustment of valences (i.e. values and goals) and/or instrumentalities (adjustment in valences is more interesting).

But differing individuals or groups in the organisation may not only have different views of the values of specific organisational goals they may have different levels or degrees of understanding of those goals. One may be preoccupied with technical outputs and indifferent to social and authority objectives. The other may be preoccupied with social consequences of that output and indifferent to economic considerations. Alternatively, one may have an awareness of a wide range of outputs for which members are corporately responsible. Beliefs, values, and expectancies, therefore, all enter into the negotiations over reciprocal decision making and hence the unpredictability of the result. They also increase disturbance to individuals when the premises of decision making or the objectives of the relatively remote elite change.

In all this, individuals' personal goals are affected. Expression 5 emphasises the potential involvement of personal factors in decision making. Compromise on the right action to adopt for organisational goals may have cost in terms of personal needs. Increasing interdependence means that achievement must be shared and a (probably valued) sense of autonomy lost. The intrusion of others' views on the economic and social impact of a valued technical outcome may mean that a less challenging project is undertaken and achievement needs remain unfulfilled. Alternatively a more challenging project may be undertaken with attendant risk of failure. The interplay of these

factors may be examined within the structure of Expression 6. It also enables one to make tentative suggestions regarding the factors that will influence the decisions, security and satisfaction of professionals in bureaucratic organisations, particularly in a time of change.

3.4.3. Professionals in organisations

In 3.2.3 above we considered the particular features which might influence a professional's decisions and in 3.3.3 the additional influences acting on him in a partnership. In this section we will widen this examination to include the constraints on these professionals when working in bureaucratic organisations, and the potential overlap of their professional aspirations and the organisation's corporate objectives. We must differentiate between the profession itself and its professional members. A profession, as Johnson (1972) points out, is a means of controlling an occupation and hence is the product of the division of labour in society. Professionals are those individuals who have selected that occupation because of the balance of satisfaction they anticipate it will afford to their economic, social and achievement needs and accept the code of conduct of that profession in return for the protection it affords to the status and credibility of that occupation.

In an organisation a professional is not only constrained by the technology of his craft and the authority and value structure of his professional association, he is also influenced by the techno-economic, social and authority systems of his employing body (12). He will therefore have to take its stated objectives into account in his decision making. An engineer will not only be working in partnership with other engineers (as in 3.3.3) but will also have to interact with

other professional groups and administrators whose values and goals are more clearly differentiated from his own.

We will consider two potential areas of conflict: first "vertically" in the hierarchy, and secondly "horizontally" between specialised groups. Conflict will arise in the hierarchy during the developmental process between policy decision and implementation when one tier differs from the next in its values and perceptions. Politicians, bureaucrats and professionals are likely to differ in this way. Consequently there is likely to be conflict in the hierarchy between what Parsons (1960) called the institutional, managerial, and technical levels - at the "points of articulation" in the system. It would be simplistic to assume that, in local government, the institutional level is occupied by politicians, the managerial level by bureaucrats and the technical level by engineers. Senior engineers have an institutional role and interact with politicians in policy making. In the case of highway authorities, the managerial level largely consists of engineer-administrators. Barber (1963) stresses that conflict between the middle and bottom tier is minimised when professional administrators occupy the managerial levels. However there may be conflict for these engineer managers between their bureaucratic and professional roles. Professionals, suggest Blau and Scott (1963) are bound by the interests of their client: bureaucrats by the interests of their organisation. A professional's authority is rooted in his expertise and the shared values of his profession; a bureaucrat's in the formal sanctions of the organisation. A professional's decisions are governed by internalised professional standards and values; a bureaucrat's by disciplined compliance with rules and directives (and, one might add, loyalty to the perceived intentions of his masters). If a professional's decisions are

questioned, the last court of appeal is his professional group. For bureaucrats, the last court of appeal is at the prerogative of senior management, the Crown, or, in the case of those in local government, locally elected members.

For engineers and other professionals in this position (particularly those with a primarily managerial role) the range of factors and values in their decision making is therefore wider than for the pure professional. In particular they must give greater weight to the authority goals and stability of their organisation. Some writers refer to a "displacement of goals" when a professional becomes identified with the rules and practices of the organisation rather than its stated social or technical objectives. From a consideration of the multiple personal and organisational values in Expression 6, however, the process may be a totally rational re-balancing of goals.

Professionals in the middle tiers of local government recommend goals to the institutional (political) level, advise them of expectancies and provide them with instrumentalities. Expectancies and instrumentalities, lower level "means" to political "ends", are the professional's sphere of expertise. He will guard his autonomy (and/or that of his professional group) in this area and may wish to close his mind to some of the higher order goals of the organisation. However he may nonetheless be drawn into the institutional level of negotiation and compromise and find a measure of ambiguity in his role. From a geometrical viewpoint one could say that this involvement distorts his action space and causes a blurring of the boundary of the organisational overlap. In the hierarchical, developmental process the professional may therefore find difficulty in resolving incompatibilities within his own "decision making equation".

The aggregative process, across the specialised groups in the organisation, may also cause conflict particularly when reciprocal, rather than sequential, interdependence exists. Because of their commitment to the end product of their work (Gerstl and Hutton 1966), engineers will be particularly vulnerable to loss of satisfaction through loss of autonomy and lack of progress towards completion of a project. The potential difficulties when two engineers are in partnership have already been noted in 3.3.3, but in an organisation the degree of differentiation between engineers from differing specialist groups is likely to be greater. They will have different group loyalties, different concepts of the goals of the organisation (because their groups provide differing means towards organisational ends), and quite possibly different backgrounds and professional experience.

Sequential interdependence should not cause problems. If a member of another group is providing information, funds, or other instrumentalities to enable an individual to carry out his specialised task then there is no loss of autonomy in decision making for the recipient, unless a valued element of his work is pre-empted. His job satisfaction will therefore not suffer and may even be enhanced because achievement is facilitated by the link. If however it is a reciprocal relationship and responsibility for an output is shared, or one is dependent on the other for advice and opinion, there must be greater dependence in the link, an associated loss of autonomy and satisfaction, and increased risk of conflict over values and goals. Their action spaces overlap but their goal axes may be skewed to each other. It may be impossible to reach compromise at their level and the problem may have to be escalated to a higher level in the hierarchy where a greater identity of view over organisational goals exist or

power and resources exist to successfully exert one (partial) view. Alternatively the authority system may have to be revised to obviate the interdependence in the technical system.

In a time of change goals are changing, values are changing, expectancies are lowered and instrumentalities may be in short supply. Those in the middle tiers of the hierarchy may be able to adapt to change because of their acquaintance with a wider and higher level of organisational interests. Those at the lower, technical, levels will be particularly vulnerable to a change in objectives, or a re-balancing between techno-economic, social and authority constraints, because their organisational role and personal goals are tied to their product. Johns (1973) considers individual's resistance to change in terms of their anxieties that it may provoke loss of achievement satisfaction, or the satisfaction of more basic needs. He suggests that an individual may resist change because of fear of reduced wages or redundancy (economic needs), disturbance of social ties (social needs) or de-skilling of the task and boredom (achievement needs). This may be only a temporary situation until new skills can be defined and claimed and new definitions of achievement constructed; i.e. this problem may be one of loss of order and the destruction of the assumptive world. The wider the range of values and goals influencing an individual's decision making, the more he will be exposed to the impact of change, since any one (or more) of the three sources (or rational bases) of change can eventually be transmitted to him through the links in the organisational network.

It is the dependence of the engineer's personal needs - and in particular his need for achievement - on the activities he performs in the organisation which complicates his experience of change. As his "patterned interaction" with his colleagues changes, so too will the

shape, and consequential satisfaction, of his action space. The object of this chapter has been to provide a consistent framework to aid understanding of individual's experience of, and reaction to, the changes described in subsequent chapters. This is compatible with the "bottom-up" viewpoint of this study. It was also hoped to achieve a comprehensive framework which would apply to individuals, groups and organisations as a whole. In the first chapter this was likened to "taking a single line of sight on an organisation, but adjusting the depth of focus to give different planes of vision" (p. 18). It is the network analogy which is intended to provide this comprehensiveness - is it adequate for this purpose?

3.5 THE NETWORK CONCEPT AS AN INTEGRATIVE FRAMEWORK

In this chapter we have developed a three dimensional concept of an individual's needs and goals and of the action space in which he seeks to realise these objectives. We have associated this with a cognitive formulation of the factors influencing action within that action space. We have then expanded the concept to include the effect on decisions and behaviour of relationships with others and in particular with others in organisations and in their environments. We have therefore considered the action of an individual node, a node linked to another node, and finally multiplex linked nodes in multiple organisational networks. Because of the emphasis on decision making by the nodes, however, it remains an individual-centred model with consequential similarities to Simon's (1976) rational decision making approach. He claimed that his description of organisational behaviour was integrative - providing a general framework for understanding not only organisation members but also the organisations themselves. Mouzelis (1975) denies this claim:-

"As far as individual decision making is concerned, this claim has a certain degree of validity But this integration stops on the level of individual decision making. When one moves from the individual level to the consideration of the organisation as a whole, the integrative character of the theory disappears. Indeed when

one considers the whole organisation as a network of decision centres or as an information processing system it is very difficult to account for its culture, for its status system, and for all those organisational features traditionally treated under the informal organisation label". (Mouzelis 1975, p. 136, 137). This is not to deny the validity of Simon's concept of organisations as a structured network of decision centres, but rather to suggest that it is incomplete. For comprehensiveness, Mouzelis would require both the formal authority decision making structure and also the informal social structure to be included in the organisational model. Simon accepts that this consideration of organisational role-enacting decision making and behaviour in isolation from personal and social motivation is "an abstraction from the complexities of real life" (Simon 1964, p.12). He suggests, however, that the abstraction is tenable because many organisational decisions do not affect personal motivation at all, or that personal motives may enter the decision process only as fixed constraints.

We have seen in Chapter 2 that Argyris emphasised the significance of personal and social influences on organisational decision making. He accordingly criticises Simon's rational decision-making concepts because "they exclude variables that are important to their domain, are unable to make predictions about events central to their concerns, and are supportive to the status quo" (Argyris 1973, p.203). For a comprehensive picture, Argyris, like Mouzelis, would consider it essential to include social and cultural influences in the integration of the individual into the organisation. But underlying this concern to reflect the full complexities of organisational life there lies a more fundamental dichotomy: the extent to which integrating the elements of an organisation can ever truly represent the total organisation: the extent to which an organisation is greater than the sum of its parts. Clearly in describing organisations it is necessary to use terms which are inapplicable at the individual level. Culture, status, and tradition are characteristics of the organisation as a whole and are inherited and adapted by each generation of organisation

members. Hartwig (1978), from a more abstract point of view, identifies a change in "level" of rationality in organisations from individual decision making (substantive rationality) to organisational decision making (functional rationality), implying a clear differentiation between the two rather than a gradual transition from one to another.

There is a danger of reification here - that is the attribution of concrete reality to what Silverman refers to as "social constructs". An organisation does not itself act; "it is merely a representation of certain meanings held by actors and is reducible to those meanings" (Silverman 1970, p. 141). When those meanings change, the organisation changes. Because characteristics such as culture and status are generated by the members of an organisation under the constraint of their colleagues and the organisation's environment it would appear to be legitimate to construct a model of an organisation as the summation of its individual members providing the full complexity and structure of inter-relationships is recognised. This the foregoing analysis has endeavoured to do by building multiple dimensions and structure into the network model and a wide range of values and objectives into the cognition of individual members of the organisation and hence into their contribution to its action space.

By building social, techno-economic, and authority dimensions into the network model postulated in this chapter equal importance is given to both the formal authority structure of the organisation and the informal structures generated by its members. Many decisions may, as Simon points out, only have significance for the formal organisational structure. Others, which have multiple objectives, may influence all three networks. The most significant aspect of those networks is their configuration.

By analogy with the natural sciences and personal experience we would anticipate that the characteristics of an organisation will be determined by its structure. Without structure a piece of music would be a collection of notes, and a molecular model a handful of brightly

coloured balls. For networks this must be so, because the shape of the network determines members opportunities to constrain and react to each other. Hence writers' concern for the shape of social networks, and individuals' locations in them. Clyde Mitchell (1969) illustrated how a central position in the configuration of a network gives power to the post-holder. Aldrich (1979) discusses how loose-coupling between sections of the network localises the impact of change. Talcott Parsons (1960) described the overall configuration of organisational structure with points of articulation between the institutional, managerial, and technical systems. In describing organisational characteristics of this nature these writers, with their several concerns, are illustrating the significance of the configuration of a network for the activity of the whole organisation, of its parts, and of its members. Much more so when multiple networks with differing structures are considered in a single organisation. Without this configuration to its linkages an organisation would merely be a collection of individuals.

The multiplicity of networks is reflected in the multiplicity of factors considered in Expressions 1 - 6 above to enter into individuals cognition. These expressions, which were developed from Vroom's expectancy model, represented the wide range of organisational and individual objectives influencing decision making by organisational members. As such they are compatible with both the rational decision making model of man and the human relations approach. Simon (1964) discussed the manner in which the decision making "equation" of individuals produces a constraint set for the organisation (or for its power-holders) which might be considered to be the "organisational goal". Although members at lower levels in the organisation may only perceive lower-level goals in the means-ends chain of organisational decision making whilst those at the boundaries of the authority perceive higher goals, these various levels of organisational goals are themselves an integrating factor in organisational life.

Cartwright and Zander (1968) consider the extent to which individual members' goals for a group or an organisation can become

integrated into group or organisational goals. There is an interdependence and process of bargaining and compromise here which leads to the adoption of a commonly perceived goal within the "constraint set" of individual objectives. Bargaining takes place as part of the interaction of individuals and the structure of those interactions (and hence the networks) will determine an individuals opportunities to influence or be concerned with the higher level organisational goals. Because of interdependence within the organisation for many tasks, the organisational product may itself be integrative. The concept of individual action spaces "overlapped" by other members in the organisation provides a picture of this process of interactions, bargaining and compromise.

We pictured the "work" element of an individual's action space as his work "role". Mouzelis (1975) suggests that "the role concepts is the most convenient bridge from the individual to the group, organisation, and level in social analysis" (p. 218). We would suggest that the concept of an individual's work action space, constrained and facilitated by the overlap with other members of the organisation, and bounded by his perceptions of organisational goals provides a corresponding bridge between the individual, his group, and the organisation. It will be recalled that Bowey (1976) used a "role axiom" in developing concepts to assist in the interpretation of larger scale phenomena than individual action. If then, this work action space is equivalent to the individual's role at work, then the sum-total of these action spaces will be the organisation's action space. Environmental constraints might require or permit a somewhat different space, but the actions of individual members, or the resources available to the organisation might not be sufficient to fill it. The possibility of organisation activity and objectives being divergent is therefore accommodated within the action space concept.

These considerations of the range and scope of the concepts developed in this chapter would appear to justify the claim that they are both consistent, comprehensive, and integrative. The complexity of the multi-dimensional models developed reflect the complexity of

organisational life. Perhaps there remain large scale organisational phenomenon which the integrated network model cannot explain. In part these are influenced by environmental pressures and these will be considered in the next chapter. In part they are the consequences rather than the causes of individual and group activity and therefore of less relevance to the investigation which follows. For the writer the concepts developed in this chapter provide a comprehensive basis for understanding the causes of the experiences and reactions of a particular group of individuals during the last decade.

Notes to Chapter 3

1. Handy (1976) suggests that each individual has a set of needs and of desired results and that he calculates how much "E" (which stands for effort, energy, excitement, expenditure, etc) to invest - hence the "motivational calculus".
2. Just as goals constrain an individual's action space, so his values delimit his "assumptive world" (Young 1977). Our concern with "meaningful action" makes the action space concept more valuable.
3. See for example Heneman III and Schwab (1972) and Whaba and House (1974)
4. The formulation is not quite the same as that used by Vroom, but it appears necessary to separate first level outcomes j from second level outcomes k for clarity.
5. The ideal of service to the community is seen as being a core, generating trait (together with a basic body of abstract knowledge) for true professions (Etzioni 1969).
6. The impact may be on what Rokeach (1973) would describe as Instrumental Values - a desire to present an open-minded, helpful, sincere image to the public and to become committed to those values.
7. "Sent" role is the communicated expectation of those with whom the focal person is in contact; "received" role is the focal person's perception of the sent role: see Kahn et al 1964.
8. In a conflict situation the heightened perception of instrumentality might result from a threat that any other action would incur a penalty.
9. Whilst some writers view professionals as being actuated by concern for others (altruism), others highlight the harmful effects of their monopolistic practices (Johnson 1972). In this sense their commitment might either be seen as being to the public community or to the professional community.
10. The means of controlling the interdependence will also vary - from simple programmes and schedules for pooled independence to meetings and sophisticated programming techniques for reciprocal interdependence - see Lawrence and Lorsch (1972).
11. Of course his choices may be constrained by the actions of the previous participant in the sequence. The "end" is not affected but the range of "means" available may be limited by the previous contribution.
12. His profession may have been more or less successful in capturing the authority system, e.g. the medical profession and to a lesser extent the continuing dominance of highway engineers over the officer input into transportation decision making in local government. The situation has not changed radically since the review by Griffith (1966).

CHAPTER 4

ENVIRONMENTAL CHANGE FOR HIGHWAY ENGINEERS AND THEIR ORGANISATIONS

4.1. ENVIRONMENTAL CONCEPTS

In this chapter we intend to identify sources of change in the environment of highway engineers and their employing authorities over the last decade, and the implications of those changes for the individuals and organisations concerned. Thus far, the environment has been conceptualised as an inter-organisational network, conveying social, techno-economic, and authority resources and constraints to the focal organisation. While this approach is consistent with the intra-organisational network concepts explored in the last chapter, it could tend to obscure the essential differences between the internal and external environments. The internal network is bounded and regulated by participation in shared functions, products, or services - membership is known, and actions and reactions are relatively predictable. By contrast the external network is only bounded by the knowledge of organisational members and its configuration, relationships, and supply of resources are less predictable. Individuals must therefore perceive the external environment as being less certain and controllable than the internal environment.

Yet it is from the external environment that the impetus of the majority of changes for an organisation originate. The organisation is dependent on the environment for financial, personnel, technical, informative, and institutional resources, and in turn returns products and services to the environment. Before, therefore, we can explore organisational and individual reactions to change in the light of the concepts developed in the last chapter, we must clarify our conceptualisation of the interdependencies between organisations and the external environment and of the environment itself.

Many of the perspectives which attempt to explain the nature of the relationship between organisations and their environments have focussed on adaptation by organisations to environmental constraints. This is to take an open-systems view of the organisation as being

dependent for survival and efficiency upon an exchange of resources and services with its environment. The degree of abstraction varies. Emery and Trist (1969) take an abstract or near-biological viewpoint in describing how the distribution of resources in an environment (its "causal texture") might favour particular organisational characteristics. Aldrich (1979) and Pfeffer (1978) adopt a similar perspective in propounding a "natural selection" or evolutionary model of the process by which, in the longer term, environmental pressures determine which organisational structures will be best fitted to acquire the needed resources from the environment. This degree of abstraction inevitably takes an impersonal view of the organisation. There is less abstraction and greater emphasis on the perceptions of members of organisations who are responsible for these acquisition procedures in the "rational selection" or information perspective. Adopting this viewpoint, Lawrence and Lorsch (1967) and Duncan (1972) considered contingent factors influencing organisational or decision-making structures in the light of decision-makers perceptions of environmental uncertainty.

Whether from a "natural selection" or a "rational selection" viewpoint, however, it is the environment which is seen as being the determining factor. In so far as we have taken information to be a resource on a par with other instrumentalities such as finance or personnel we can reconcile the natural selection and rational selection models and relate both to the configuration of the inter-organisational network. We will not be concerned with this network as a determinant of organisational structure, since our "bottom-up" interest is with the role of organisation decision makers and the choices they make in adjusting both structure and process to their perceptions of environmental demands. Child (1972) suggests that studies of the environmental determinants of organisational dependence (whether on resources or information) and structure ignore the "essentially political process whereby power-holders within organisations decide upon courses of strategic action" (Child 1972, p.1). His concept of strategic choice is germane to this preoccupation with the perceptions

and independence of decision makers. With regard to their choices the cognitive model developed in the last chapter highlights the importance of uncertainty to decision makers because of its effect upon their perceptions of expectancy and instrumentality in action-outcome and outcome-outcome assessments.

We will therefore wish to express the characteristics of the environment and interdependence between it and the focal organisation in terms of a more detailed inter-organisational network model. This in turn may assist in refining our concept of organisational action space.

4.1.1 Characteristics of Environments

We have accepted that organisations and their members are dependent on the environment for resources necessary to their activities - including information. The characteristics of environments are therefore critical to organisational survival, since they will determine organisations' ability to acquire the resources required. Writers have suggested numerous ways of analysing and categorising the environment. Thompson (1967) proposed that the environment should be categorised as stable or shifting, and homogeneous or heterogeneous (or located along continua between these extremes). Duncan (1972) gave empirical expression to these two measures. They also underlie Emery and Trist's (1965) characterisation of four causal-textures in the environment: a placid randomised environment (i.e. stable/homogeneous), a placid clustered environment (i.e. stable/heterogeneous), a disturbed reactive environment (i.e. unstable/heterogeneous), and finally turbulent fields. Turbulent conditions are experienced when environments themselves are changing in addition to the distribution and location of resources within them. Heterogeneity/homogeneity is a measure of the complexity of the environment, and Duncan (1972) points out that organisations can cope with complexity more readily than instability since they can make provision for and take account of the first with greater certainty than the second. Similarly Pfeffer (1978) shows that uncertainty only

arises when instability is unplanned and incapable of prediction. If the change can be forecast, then a state of uncertainty does not exist.

In addition to the heterogeneous/homogeneous (or "complex"), stability/instability (or "variable"), measures of environments as resource fields, Child (1972) adds a third, "liberality". This measures the degree of threat facing organisational decision-makers in the achievement of their goals from external competition or indifference. Together these three measures of complexity, variability and liberality provide a readily comprehensible, if not comprehensive, characterisation of the environment. To take an example from the field of this investigation, the social environment of highway engineers over the last decade can be seen to have tended towards greater variability (as successive government directives have changed the extent of public participation in decision making), greater complexity (as individuals and pressure groups have become more vocal in challenging proposed schemes), and less liberal (as the public acceptability of the major highway programmes has decreased).

Khandwalla (1970) originally adopted similar dimensions to characterise environments, but in later work (1977) he differentiated between hostility and restrictiveness of the environment both of which might be considered to be related to illiberality, and between turbulence and technical complexity, both of which might be taken to be special cases of complexity. His concept of variability remains unchanged.

Because resource dependence is so central to the environmental selection model it is understandable that Aldrich (1979) presents perhaps the most comprehensive list of environmental dimensions. "The dimensions are relevant to environmental selection because they refer to the nature and the distribution of resources in the environment, with different values on the dimensions implying differences in appropriate structures and activities. Each dimension should be viewed as a continuum" (Aldrich 1979, p.63). We would wish to modify this to read "differences in decision makers perceptions of appropriate structures and activities". The question must also be, however,

whether decision makers would be able to differentiate between six dimensions, or whether the variability, complexity, liberality set will suffice.

Aldrich's set includes capacity, variability, complexity, concentration-dispersion, domain consensus-dissensus, and turbulence. In suggesting this set, Aldrich is seeking greater precision but it is difficult to differentiate between complexity in terms of heterogeneity-homogeneity and complexity in terms of concentration-dispersion. For the decision maker, little would appear to be gained by separating the dimension in this way. Domain consensus-dissensus and environmental capacity would appear to be special cases of liberality and here too a single dimension would appear to suffice. Turbulence is, as we saw in the work of Emery and Trist (1965) above, a valuable special case of change due to the environment "ground" itself changing. It will be particularly relevant to the possibility of interconnectedness between the three sub-environments considered previously: the social environment, the techno-economic environment, and the authority environment.

For the analysis of each sub-environment separately it would appear that measures of complexity, variability and liberality should provide a sufficiently comprehensive picture of the "texture" of an organisations's environment. Together they will influence the extent to which members of the organisation perceive its environment to be certain or uncertain. We must now consider whether they can be incorporated in the network model of organisational environment to give greater precision to the concept.

4.1.2. Characteristics of inter-organisational networks

Because the environment is made up of other organisations, groups, and individuals, it is legitimate to conceptualise it as an inter-organisational network, complementing the intra-organisational network, providing the inherent complexity and lack of definition of the first compared with the second is acknowledged. Thus there will be a vast number of personal links from organisational members to the individual

and grouped elements of the environment, and a succession of more formal and less personal links between groups and between organisations. Let us consider formal inter-organisational links at this stage, accepting that they may be in the social, techno-economic, or authority environments, and that they take place against the background of a dense mesh of more personal linkages. These inter-organisational links will form an inter-organisational network. It will have similar characteristics to Evan's (1966) "organisational set", although usually only single-step links are considered to be within the set, whilst the network concept pictures perhaps more clearly the multi-step and indirect links which almost invariably make up an organisation's environment.

If the environment has variability it will be unstable or dynamic. Consequently the configuration of the network - its linkages and the dependence within those links - will be changing. There will be no certainty that a particular link will be "open".

If the environment is complex it will be dispersed and heterogeneous. Accordingly the inter-organisational network will have numerous multi-step and multi-plex links. A number of alternative "routings" through the network are possible and individual nodes are subject to multiple influences.

If the environment is illiberal there will be conflict for resources in the network, and indeed the network may break down. There will be an element of bargaining within and between links in an endeavour to maintain the flow of scarce resources.

The condition of turbulence noted by Aldrich and other writers would be pictured as the interaction of two or more networks, increasing the uncertainty for a decision-maker, whose attention might be focussed on one network only. Thus unobserved change in the social network might change the premises of government legislation in the authority network - changing the "rules of the game" of central-local transactions in the process. If, for example, we may take the political preference for privatisation as a democratic expression of

the social will, then its impact through the authority network on activity in the technical network has certainly created a condition of turbulence for operational managers in the public sector.

Thus environmental characteristics may be pictured in the inter-organisational network with fruitful results in understanding environment-organisation relationships. The variable configuration, complex pattern of links, and liberality of resource flow in the links will both facilitate and constrain organisational activity. We have seen in the last two chapters that organisations develop internal differentiation to reduce the span of environmental uncertainty for individual decision makers. The segment of environment allocated to each differentiated group will have less complexity and variability than the total environment. Just as resources in the environment are critical to organisational survival, so the configuration (or differentiation, or segmentalisation) of the environment influences organisational structure. Writers have accordingly described a range of environmental configurations which are either said to determine effective organisational structure, or the perceptions of decision-makers.

One may differentiate between two approaches. One categorises different sub-environments, while the other identifies segments of individual sub-environment. Khandwalla (1977) refers to economic, cultural, and legal-political "components" of organisational environments, which directly relates to our breaking down of the environment into the three economic, social and authority sub-environments. We would see a clear division between these sub-environments because of the differing rationalities which influence decision making (after Hartwig 1978), and hence would justify the concept of three independent but superimposed inter-organisational networks. Other writers describe a range of elements which to some extent confuse different sub-environments with sub-divisions of particular sub-environments. Thus Lawrence and Lorsch (1969) referred to the manner in which a typical commercial undertaking segmentalises its environment so that sales divisions deal with the market sector,

production with the technology sector, while the research and development division relates to the scientific sector. Duncan (1972) in a similar vein, describes customer, supplier, competitor, socio-political, and technological "components" of a firm's environment. Clegg and Dunkerley (1980) and Hall (1977) refer to "conditions" rather than components, including technological, legal, political, economic, demographic, ecological, and cultural influences on organisations.

We would see a technology "sector" and a scientific "sector" as being differentiatable parts of technical sub-environment; customer, supplier, and competitor "components" as parts of the social environment; and legal and political "conditions" as part of the authority environment.

Considering these components or conditions as subdivisions of a sub-environment, and hence as structural elements of the social, techno-economic, or authority networks should not obscure the fact that they vary in proximity to individual actors and organisations, and hence in their influence on perceptions, processes, and structures. They also vary widely in their rates of change. Thus technological and scientific changes are comprehensible by individuals and transmitted to them through recognisable links. Demographic, ecological, and cultural influences are remote and have more the character of the "ground" against which the network "figure" is perceived. Nonetheless they are significant because it is unperceived changes in the more remote "conditions" which produce the turbulence described by Emery and Trist (1965),

The value of these descriptions of the environment for present purposes is that they remind us that there can be differentiation within the inter-organisational networks, that the degree of variation and complexity can vary within those differentiated parts and that the networks are underlain by less readily identified "ground" of shared values and expectations which set the rules of the game to transactions within the link (see Perrow 1978, p.234).

It would, in summary, appear that an inter-organisational multiple-network model of the environment can be structured to represent the variability, complexity and illiberality of an organisation's environment, whilst the superimposed social, techno-economic, and authority partial networks will reflect the multiple influences on the focal organisation. We would also expect to find that the organisation has specialised groups corresponding to the differentiated structure of the (in our case) technical partial network. We must now consider transactions in their links to the environment.

4.1.3. Characteristics of the links in the inter-organisational network

We have seen that the organisation is dependent upon its links with the environment for survival. "Survival for an organisation, an open social system, requires the maintenance of favourable exchange relationships with other groups and organisations in the environment" (Pfeffer 1966, p.112). The natural selection model of organisation-environment dependence concentrates on the exchange of resources. "From this perspective the environment consists of scarce resources sought by populations of organisations that compete for as well as share them" (Aldrich 1979, p.111). The rational selection or information model referred to above is concerned with the flow of information for rational decision making. "From this perspective the environment is a source of information used directly by decision makers as one basis for maintaining or modifying structure and activities" (Aldrich 1979, p.122).

Because information has been taken to be one of the resources transmitted through the links of our network model there is no difficulty in reconciling the two views, but we have noted that there is a philosophical difference in the two approaches which is germane to this study. The natural selection model takes the environment to be the determinant of organisational survival - selection is by virtue of a fit to external criteria. The rational selection or information model makes organisational decision makers responsible for the

organisation's perpetuation - selection is by virtue of the rational choices of participants. If information is taken to be a resource, then uncertainty about the transfer of information through the links of a network becomes a particular aspect of inter-dependence. The relative power potential in the linkage will determine whether the focal organisation or its "partner" in the organisation set has the greater discretion (or room for decisional manoeuvre). This point has been argued in the specific context of the debate on central-local relations in particular by Rhodes (1981). Drawing on his resource-dependency model he concludes: "The power-dependence or exchange framework suggests that variations in the discretion of interacting organisations are a function of their resources, goals, and relative power potential. Their relative power potential is a product of their resources, the rules of the game, and the process of exchange. Finally the process of exchange is influenced by the resources of the participant strategies, personalities, and the number of units" (Rhodes 1981, p.34 of Appendix 1).

We are concerned at this point with relative power potential in the links in the inter-organisational network as a determinant of the relative discretion of linked nodes. Rhodes reminds us that this is not only due to resource dependence, but is also influenced by the accepted rules of the transaction, and the bargaining that takes place in the process of exchange. This in turn illuminates the dynamics of the interchange process in the inter-organisational network, and the strategic role of both sender and recipient in constraining the flow of resources in the links. Thus although we may extend the intra-organisational network out into the environment with some confidence, and describe its configuration and characteristics with some analytical vigour, the flow of resources in the links is dependent on the resources and strategies of the participants and is accordingly problematic.

4.1.4. Boundary members and their perceptions of uncertainty

We have suggested that there will be partial inter-organisational

networks for the exchange of social, techno-economic and authority resources between the focal organisation and its environment. The boundary of the organisation with these three networks will not necessarily be coincident. It is those at the boundary who represent the organisation to its environment, and process information and the flow of other resources into the organisation. They filter, interpret, and direct information to the organisational units. It is those at the boundary who "absorb" uncertainty, and buffer the technological core of the organisation from its impact (Thompson 1967).

In considering environmental impact on organisations it is therefore necessary to consider which members fulfil a boundary spanning role. In the authority network senior and middle management will normally form the "bridge". In the techno-economic network it will be specialists who fulfil this role. In the social network a wider circle of organisation members, generally at "grassroots" level will represent the organisation to its social environment. As such they will, as Aldrich (1979) describes in some detail, maintain the organisation's image and enhance its social legitimacy. At the boundary there will be differentiation among organisation staff to reduce the overall complexity and variability of the environment for individual decision makers. We will see in the next two chapters the range of specialisms developed to cope with the complexity of the highway authority's technical environment, and the divergencies in their objectives and values.

Access to, and control of information is, as Mechanic (1962) illustrates, a source of power. The multiple boundary spanning members of the organisation will, therefore, by virtue of their information processing and uncertainty absorbing role, acquire power as they mediate at the boundary of the organisation's action space. Indeed they could be said to be maintaining those boundaries. Their power will not only enable them to represent the organisation to the environment, but also to bring about changes within the organisation itself. They will also endeavour to influence the environment to ensure that the organisation remains viable. Child (1972) shows that

organisation decision makers may be in a position to bring about modifications to the context of their organisation's activities, and in this and in other ways have a measure of strategic choice in reacting to economic or administrative constraints. In public sector organisations they will be particularly concerned to ensure that legitimacy is maintained in the social environment. Tolbert (1985) stresses the importance of this social or "institutional" environment in determining how organisation decision makers adapt to constraints in the economic environment.

Members may have accurate perceptions of environment exigencies but lack the power to bring about the required organisational changes. Lorsch and Morse (1974) showed that the attitudes and perceptions of members of high and low performing organisations match the characteristics of the environment but in the low performing group an adequate degree of organisational differentiation and interaction had not been achieved. It is the assumption of this study that personnel spanning boundaries in the social and techno-economic networks will seek to bring about changes in the authority network to meet their perceptions of environmental demands - whilst protecting the boundaries of the organisation's action space.

The concept of organisational action space constrained by the legitimate goals of the organisation and the influence of its social, techno-economic, and authority environments can be linked with Thompson's concept of organisational "domain" - "the organisation's domain identifies the points at which the organisation is dependent on inputs from the environment" (Thompson 1967, p.27). Similar concepts underlie Aldrich's picture of organisations seeking "niches" in the environment - "Environmental niches are distinct combinations of resources and other constraints that are sufficient to support an organisation form" (Aldrich 1979, p.28). When the supply of resources is unpredictable, the boundaries of organisation action space will accordingly be flexible.

Because the organisation action space sets a framework to decision

making by members, unstable boundaries will create uncertainty. From the cognitive model of the last chapter we can say that uncertainty for decision makers will exist because expectancies (of the outcome of actions) and instrumentalities (of the outcome of those outcomes) will be difficult to assess, and because organisational values will be undergoing modification. Variability and illiberality in the environment will feed directly into uncertainty over expectancies and instrumentalities.

Cyert and March (1963) described the strategies adopted by firms to minimise uncertainty for their decision makers, including developing standard operating procedures, isolating the impact of a variable environment in a single, loose-coupled unit, building in organisational slack to cope with fluctuating demands, and developing more accurate forecasting methods. In addition to strategic issues of this nature, uncertainty has had a central role in discussions of organisational structure. Burns and Stalker (1961) were among the first to examine and discuss different structural arrangements in organisations to cope with different degrees of environmental uncertainty. We have already referred to the later work by Lawrence and Lorsch (1969) and Duncan (1972) which adopts a similar perspective.

Although we may find in the next two chapters that there have been structural and strategic changes resulting from environmental uncertainties our main concern is with individual's experience of and reaction to change. We conclude from this short survey of environmental concepts that change in the environments of organisations will cause changes in organisational action space and individuals' perceptions. This will cause uncertainty to decision makers in general, and those with boundary spanning roles in particular. If we are to understand the impact of change on the organisation we must identify the sub-environment in which it arises, the nature of that sub-environment network, the degree of dependency in that network's links to the focal organisation, and the positions occupied by those who span the organisation's boundary with that network. If we are to understand the behaviour of individuals in reaction to change we must

look for the actions they take to resolve the uncertainty brought about by change, and to restore their equilibrium within their individual action spaces.

4.2. CHANGE IN THE TECHNO/ECONOMIC AND SOCIAL ENVIRONMENTS

During the last decade highway engineers have been influenced by a number of economic, technical, and social factors. The two principal economic factors have been the reducing funds available for highway work, and the growth in the volume of heavy lorries. The second factor is a fact of economic life. The first is partly mediated through central government financial restrictions but is also reflected in a local political desire to restrict rate rises. The changes are a sufficiently direct reaction to the nation's economic decline to be considered in this section. During the time of these economic changes two dominant technical factors have been the expanding use of computers, and the associated desire for optimisation. These changes are set against growing social awareness of the environment, and resistance to a continuing motorway programme.

4.2.1. Economic Change

Since 1974/5 the deteriorating economic position of the country has led to an extended period of constraint on highway expenditure. Figure 4.1. shows the trends in national and county expenditure on highways, with a sharp drop in the period 1975-1976 and with a relatively constant total from then on. However, as indicated by Figure 4.2., the proportion of that total allocated to physical highway work has continued to decrease. Those responsible for maintaining the country's highways have frequently called attention to the deterioration in the network which would result. Up to now the evidence has been inconclusive, but there is now more reliable justification for the view that, country-wide, certain classes of road are deteriorating (Leech, 1982). The results for Kent are less statistically reliable, because of a relatively small sample, but generally indicate a worse situation than the national average (Figure 4.3). The increasing illiberality and lack of economic capacity of the

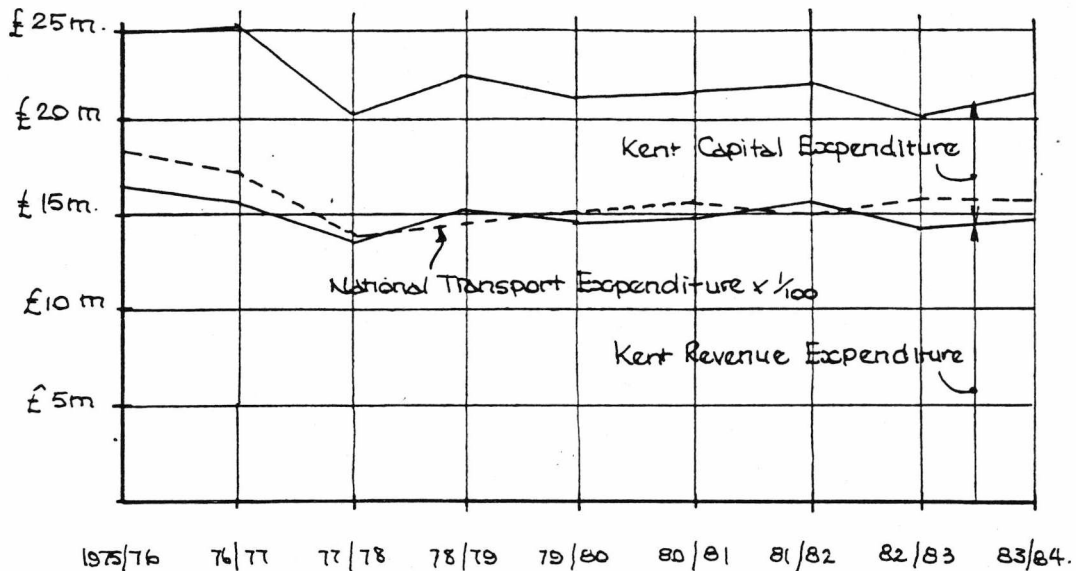


FIG 4-1 KENT HIGHWAY EXPENDITURE - TOTAL

Compared with National Transport X 1/100

1976-1977 Price base

Source: Kent C.C. Revenue and Capital Budgets
and Government Expenditure Plans

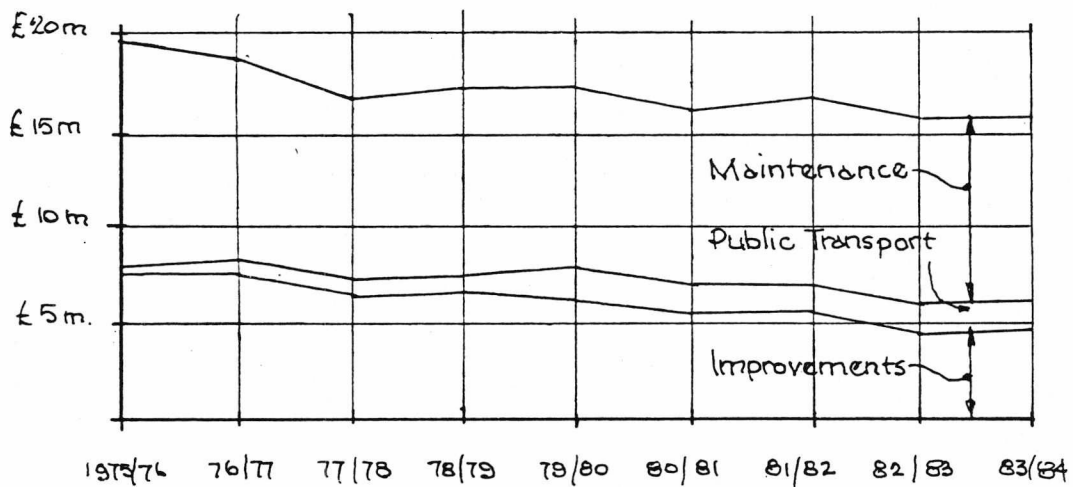


FIG 4-2 KENT HIGHWAY EXPENDITURE - SPECIFIC ITEMS

1976-1977 Price base.

Source: As for Fig. 4.1 above.

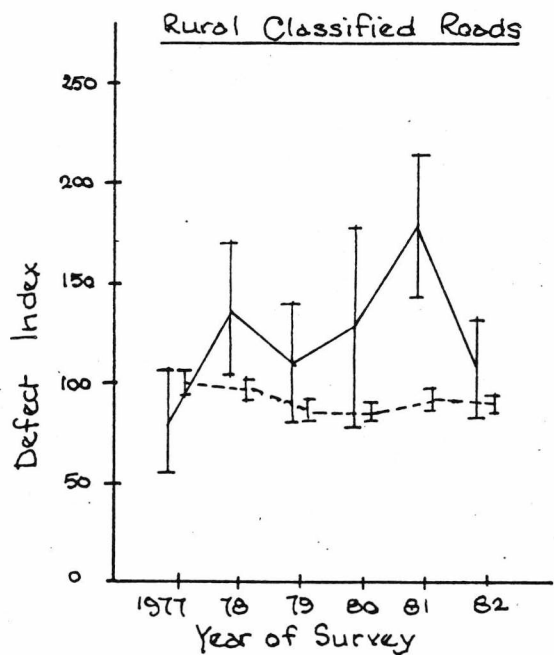
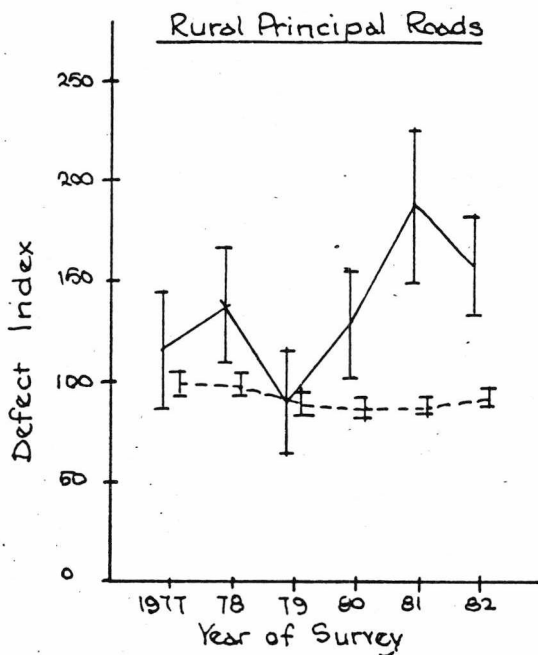
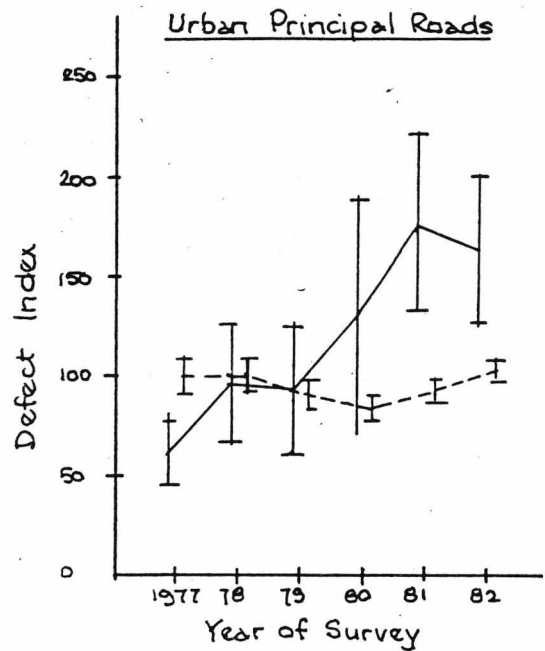
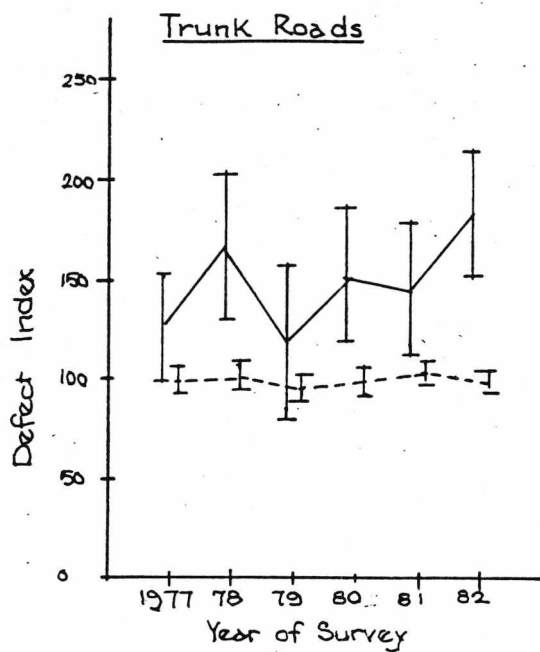


FIG 4-3 NATIONAL ROAD MAINTENANCE CONDITION
SURVEY

Rising Index = Deterioration; Falling Index = Improvement

— Kent Results ---- National Results ± 90% Confidence Limits

Source : N.R.M.C Report of 1982 Survey: Standing Ctee on Highway Maint.^{ca}

environment was appreciated by politicians and senior officers and translated into budgetary constraints. For line managers the allocations for works became uncertain and the attainment of planned programmes problematical. They came to rely heavily on the programme of works on Trunk Roads, where the flow of funds direct from government appeared to ensure greater certainty. Lack of County funds meant that they had to justify their subjective judgement of priorities and needs to Council Members and their professional colleagues. This in turn has led to the introduction of sophisticated equipment for the measurement of highway conditions, and of computer-based systems of data storage, assimilation and retrieval (1). Similarly in the highway improvement field refined systems of cost-benefit analysis have been introduced to compare investment systems for improvements works (2). The result for the practical engineer in terms of both maintenance and improvement activities has been increased dependence on geotechnical and traffic support staff.

The restriction in highway investment has, in its effect upon the highway, been compounded by the growth in traffic. In spite of the "petrol crisis" at the beginning of the period, traffic volumes have continued to grow (Fig. 4.4). Of more significance, however, is the fact that the volume of heavy lorries, the most damaging component of the total traffic flow, has grown at a higher rate. The damaging effect of a vehicle passing over the highway is proportional to the fourth power of the axle weight. For a given volume of heavy vehicles, the average axle weight has more than doubled in the last ten years (Fig.4.5). Hence the damaging effect has increased more than sixteen fold. The result for engineers is that roads subjected to heavy lorry traffic are wearing out considerably under their twenty year design life, and major reconstruction of roads built in the late 1960's has become necessary. This has introduced a significant element of long-term variability into the environment of highway engineers. To limit their consequential uncertainty they have sought more accurate predictive techniques and have introduced higher specifications for their roads to guard against future increases in load. The long-term

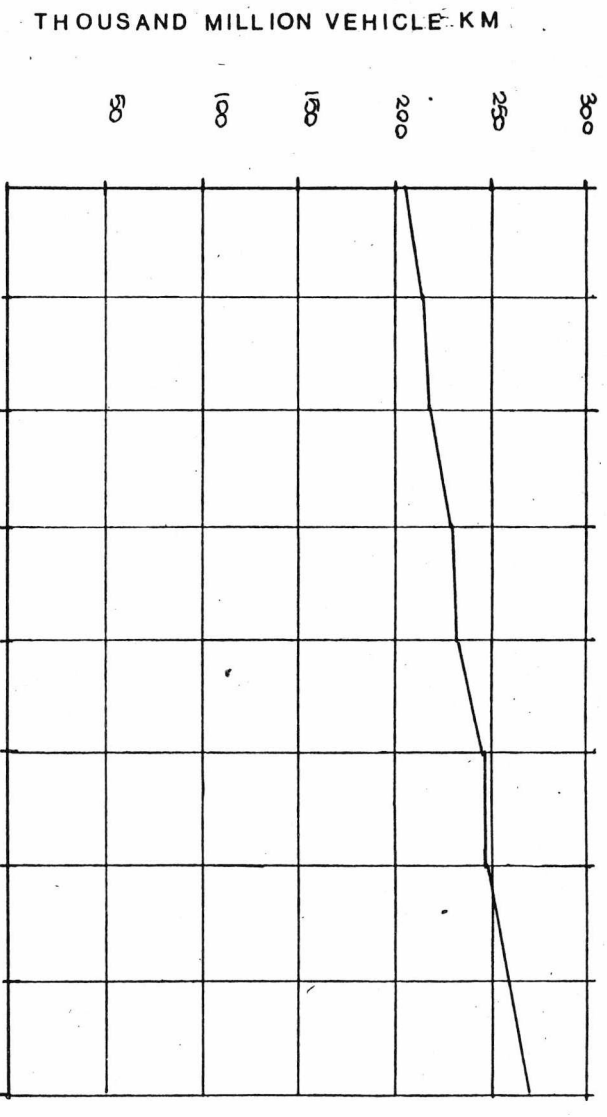


FIG 4-4 NATIONAL ROAD TRAFFIC GROWTH

Source: DTP Press Release No.549
6/12/84

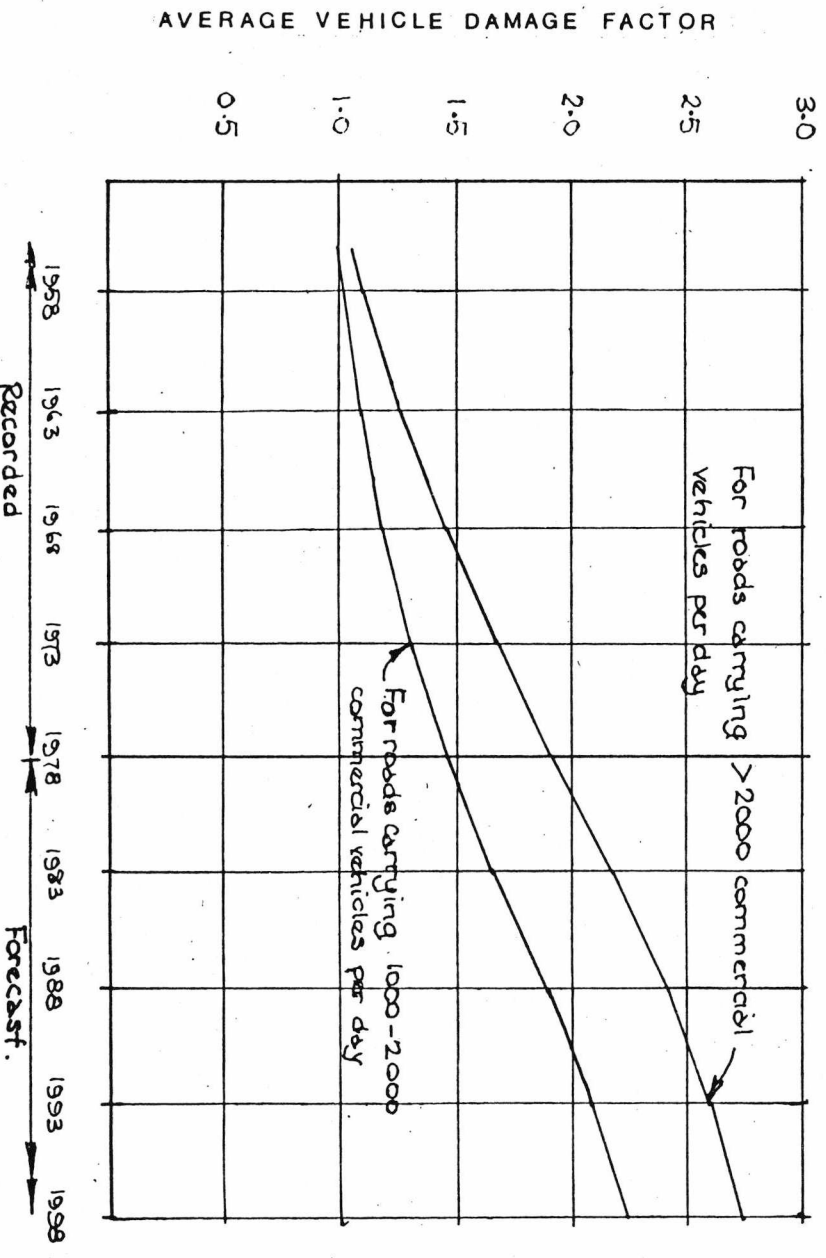


FIG 4-5 VEHICLE DAMAGE FACTOR GROWTH

Source: DTP Memo. 46/78.

economic change has therefore brought about technical change in the shorter-term.

4.2.2. Technical Change

In the technical field the dominant influence has been the greater use of the computer for calculations and data handling. This is not the place to trace in detail the changes in design techniques and traffic and resource control procedures during this period, but the county has followed national trends towards increase use of the computer and away from main frame towards smaller dedicated equipment, particularly in the field of comprehensive urban traffic control and highway condition and topographical survey data handling. In design the expansion has been less spectacular and the size of many of the programmes still requires main frame use, but there has been a significant move towards design processes which are totally computer based (from concept to plotted design) rather than following traditional processes with the computer used as a calculating tool.

These tendencies carry with them the potential for younger engineers to become so dependent on the computer that they lose the essential ability to check mentally each stage of a design for accuracy and practicability, and for older engineers to feel out of touch with modern methods and to feel inhibited in leading, advising and training their younger colleagues. It is significant that many highway engineers have achieved a deputy line manager role by the age of 30 and have, in consequence, begun to move away from the pure design role. As a result it has been all too easy for line managers to become divorced from the latest design techniques and unable to judge whether their use is cost effective and contributing to the achievement of programmes.

Associated with the growth in computer use is a phenomenon which can only be referred to as the desire for optimisation or, less charitably, the desire for complication. With vast resources of data handling and storage available there has been a tendency towards increasingly sophisticated design concepts which have militated against the savings in design times, and hence costs, which computers should

have brought. One may cite, for example, the introduction of limit-state design (3) for structures (obligatory for the design of Department of Transport bridges) which has considerably expanded by number of load cases considered for even simple structures without as yet any guarantee of greater economy in the completed structure, but has certainly increased design costs.

Associated processes have reflected a similar tendency towards complication. As a result of change in the standard method of measurement for contracts (4) and the conditions of contract (5) contract documentation has increased in volume three fold during the last decade (the set of documents for a recent contract weighed 1½ cwt).

These changes originated in the technical environment of highway organisations and have achieved an impact through a variety of channels. It is a heterogeneous environment with information on new techniques transmitted through personal, professional and inter-authority links. The changes in design philosophy and data handling brought about by the "computer revolution" has introduced an element of turbulence into many middle-aged engineers' lives. Some changes have been backed up by Department of Transport sanctions. Others have been introduced by boundary spanning experts who have gained influence through the application of new techniques. The "generalists" have reacted to the increased technical uncertainty of their lives by becoming dependent on those experts or concentrating on the managerial aspects of their tasks, leaving technicalities to younger assistants. This increased dependence and loss of autonomy has inevitably influenced the nature, if not the extent, of their job satisfaction.

4.2.3. Social Change

During this time the social esteem of the highway engineer has also changed. At the beginning of the 1970's the major motorway programme was still under way, and generally accepted as benefiting the country. Levin (1979) has shown how, as recently as the 1970's, public inquiries into road schemes were quiet, calm and orderly affairs, where

protest was rare. But in November 1975 a large, vociferous and determined body of local objectors prevented the public inquiry into the Airedale Trunk Road from taking place. "Highway inquiries, road-building policy and indeed national transport policy have not been the same since" (p.2). In part the objectors were protesting at the nature of the inquiry procedure, but also the need for and credibility of a continuing road building programme was increasingly being challenged. Eventually this had an impact on the programme itself. Painter (1980) has described how an apparently self-contained and secure roads programme became increasingly vulnerable in the 1970's. The causes of the change were inter-related. First the growing opposition to the roads programme referred to above found expression in highly militant groups such as Friends of the Earth and the National Motorways Action Committee. These groups attacked the roads programme as a whole, challenging the need for a road rather than arguing about its route. Secondly, opposition of this nature, and procedural attempts to placate it, led to increasing "slippage" in the road programme, so that its impetus was arrested and its credibility decreased. Thirdly, growing political support for public transport and economic pressures from other sectors was, as a result, able to find expression in cuts in the road programme which was in fact slowing down of its own accord owing to the other two causes.

The loss of impetus in highway programmes, and the reduced acceptability of major highway construction which brought it about, represented a loss of institutional support for highway engineers. The sudden illiberality of the social environment was a challenge to engineers professional perception of the best interests of their "clients" - and to their opportunities for achievement. Faced with this uncertainty in the social dimension of their task, great efforts were made to "sell" their products by personal contact and public consultation. The texture of their environment changed as a result - from the homogeneous "public at large" to a complex group of individuals and pressure groups pushing their particular interest. These changes were compounded, and in part generated, by change in their authority environment.

4.3. CHANGE IN THE EXTERNAL AUTHORITY ENVIRONMENT - GOVERNMENT

LEGISLATION AND DIRECTIVES

Change in the external techno-economic and social environment is gradual, and the environments themselves are heterogeneous and dispersed. The change may, however, be experienced as sudden and radical by an individual or organisation if mediated through another organisation - because that other organisation's decisions and actions will be intermittent responses to its own perception of long-term environmental change.

If the other organisation can exert authority over the first organisation or its members it will do so through the legal-political (authority) network. The dominant influence for local government organisations is central government, and their external authority environments are accordingly concentrated in this respect.

The government of the day promulgates policies and statutes which it regards as relevant reactions to the social, economic and political pressures in its external environment. The extent to which, in doing so, it reflects the wishes of the electorate, and hence its social environments, is a matter of debate among classical writers on democracy. In practice, democratic government relies on a balance being struck between the responsiveness of the few who govern to the views of their electors and the ability of the few to make and implement decisions. There is a dichotomy here between democracy and efficiency. Dearlove (1979) quotes John Stuart Mill's (1862) view of the two (at times conflicting) "criteria of goodness of government", as a "set of organised arrangements for public business" where efficiency and limited participation were the order of the day. So in government practice there may be a conflict between social (democratic) and economic (efficiency) objectives, quite apart from the impossibility of reflecting all shades of social opinion and the full range of social needs. Perhaps one might say that governments segmentalise their social environments, reacting differentially to their pressures, and preferentially to certain of their values in

reaching economic and social decisions.

It will not be germane to this study to trace the change and development of political ideas and influence over recent years. As Hill et al (1979) have pointed out, the advantage of a "bottom-up" view such as that of this study, is that the process of policy creation may be ignored and we may concentrate on the decisions that result. Acts of Parliament and government directives are the translation of one or more policy stances into a series of decisions, which impact upon local authorities and their members with legal authority. It will therefore be relevant to consider significant statutes and directives promulgated by government in pursuit of economic and social objectives over the past decade. Under the economic heading one may place the 1970 Marshall report, the 1974 Local Government Act (in so far as it relates to Transport Supplementary Grants), the 1980 Rayner Report (on Road Constructions Units), and the 1980 Local Government Planning and Land Act (in relation to Direct Labour Organisations). Under the democratic/social heading one must group the public participation aspects of the 1971 Town and Country Planning Act, the 1973 Land Compensation Act, and the 1978 Review of Highway Inquiry Procedures. Inevitably, the 1972 Local Government Act falls under and between both headings.

4.3.1. Local Government Act 1972

Let us start then with the 1972 Local Government Act which brought about the most profound change in local government this century. The pattern of County, County Borough, Borough, Urban District, and Rural District councils had been subject to a long period of examination, criticism and report, particularly after the 1939-45 war.

The report (Command 4040, 1969) of the Royal Commission on Local Government (the Radcliffe-Maud Commission) identified six weaknesses of the existing system: the division between town and country, the division between county borough and counties, the division of responsibilities within counties, the small size of many authorities, the relationship (or lack of it) between local authorities and the

public, and the relationship (and dependence) of local authorities and central government. The majority view of the Commission was that the existing two tier structure of local government should be swept away and replaced by multi-function unitary authorities. This view was generally accepted by the then Labour government, and translated into its White Paper on "Reform of Local Government in England" (Command 4276, 1970). However, there remained considerable hostility to the unitary concept. Perhaps for this reason the subsequent Conservative government's White Paper on "Local Government in England" (Command 4584, 1971) which proposed that a two tier structure should be retained and had respect for existing boundaries, met with considerably less opposition. The subsequent Local Government Bill had a relatively easy passage to the statute book, becoming law in 1972. Through Section 1 of the Act the previous complexity of local authorities was swept away and larger district councils, embracing both urban and rural areas were created in their place. In Kent the County Council boundary remained unchanged but the previous 49 urban and rural authorities were amalgamated into 14 districts.

Under part IX of the Act district authorities became autonomous planning authorities, emphasising the objective of the Act of enhancing local democracy. However, the County Council became the sole highway authority, emphasising the economic and strategic objectives of the Act. This policy of creating single highway authorities was, however, blurred in two respects. First, the new district authorities were enabled to maintain urban unclassified roads (clause 187) and there was provision for one authority to make agreement with another authority to carry its functions on its behalf. Thus the way was open for districts, inheriting as many of them did staff and labour experienced in highway work, to seek to carry out highway activities for the County Council as its agents. A case could be made for agencies in terms of local democracy and participation, and heated negotiation ensued between the shadow county and district authorities over the extent to which agencies should be granted. Circular 131/72 (1972) published by the Department of Environment endeavoured to set out objectives that should be borne in mind when making agency agreements. The principal

objective should be to "improve the effectiveness and democratic discharge of local government functions" - ignoring the potential conflict between the two. Disputes were to be settled by the Secretary of State before 1st April 1974. 60 applications were made to the Department of Environment by districts seeking wider agency powers than their counties would allow. 14 were successful and 46 were refused.

In Kent the compromise arrived at was that 5 of 14 districts were enabled to act as the county's agent for routine highway activities throughout their districts while the remaining 9 became responsible to the county for those activities within the "urban nuclei" of their districts. Two appealed to the Secretary of State for an enlargement of their urban nuclei but their appeals were rejected.

Thus in designing their new organisation and committee structures the new county and district authorities had to provide for the highway functions remaining with or allocated to them, and establish procedures, governed by the agreements signed with each agent authority on the 1st April 1974, for the allocation, coordination and control of that work. Consequential changes within organisations are dealt with in the next chapter. At this stage it should be noted that this single major event in the authority network, backed by legal sanctions, brought about three stages of change. First, senior elected members at the authority boundary of organisations, advised by their senior officers, planned new organisations to cope with future tasks. Second, officers appointed to these new organisations prepared procedures, budgets, and plans for carrying out those functions. Third, relationships developed between and within authorities for the exchange of information, resources, and products and other functional necessities. Individuals involved in the changes experienced the uncertainty of new organisations, new relationships, new procedures and new tasks. The major initiative by central government in the authority environment, resulting immediately in adjustments in the authority networks therefore subsequently led to associated changes in the technical and social networks.

Against this background of the reorganised local authorities we can now consider the other significant economic and social legislation and reports emanating from central government throughout and immediately preceding this period.

4.3.2. The Marshall Report 1970

Of the four reports and Acts listed above as having economic objectives, the first was the Report of the Committee on Highway Maintenance - the Marshall Report (1970). The Committee was appointed in October 1967 under the Chairmanship of Dr. A.H. Marshall, to consider and make recommendations on the planning, execution and financial control of highway maintenance work. The committee was asked in particular to consider output measures and associated reporting systems, maintenance standards and the measurement and improvement of productivity.

In the event the report primarily related to carriageway standards and works control. Moves to improve labour efficiency, through incentive bonus schemes and mechanisation, were already underway. The major impact of the Marshall report was therefore in relation to the measurement, safeguarding and improvement of carriageway standards. The standards set by the Marshall Committee were generally accepted as being too high. Funds were not available for their achievement and more limited objectives have had to be set - particularly in view of the deterioration in the economic climate which has ensued. However, the report's recommendation that the highway network should be periodically surveyed and the extent to which it is cracked, deformed, rutting or disintegrating methodically recorded as an aid to future decision making, has had a wide impact. Modified survey systems known as the CHART (6) and MARCH (7) systems associated with computer programmes for the storage, assimilation, and retrieval of data have added a cutting edge of objective data to the maintenance manager's decision making. This has been complemented by the development of mechanical means of measuring highway surface or structural conditions such as the SCRIM (8) and deflectograph (9) machines. A proportion of

the maintenance task remains routine, and perhaps more akin to agricultural work than engineering - cutting the grass, sweeping the roads, patching potholes, and replacing white lines. Major maintenance to the structure of main roads and the planning and assessment of that task has, since the Marshall report, become increasingly sophisticated. For the maintenance engineer, the Marshall Report has led to a major change in his technical environment. It has brought into focus a dichotomy between his objectives of providing a local service, and maintaining the capital asset of the highway. New techniques have caused a loss of autonomy and increased dependence on experts. His technical environment, static for many years, has suddenly become dynamic and complex. In the consequential uncertainty some engineers have surrendered responsibility for the assessment of needs to others, and have concentrated on providing a service within the resources made available to them.

4.3.3. Local Government Act 1974

The drive for objectivity was reflected in the new systems introduced by the Department of the Environment under the provisions of the Local Government Act 1974. This Act brought to an end the plethora of grants previously administered by central government for the support of local government highway and transport activities and replaced them by a single Transport Supplementary Grant. The need for reform had been common ground between the then government, and the House of Commons Select Committee on Expenditure (10). Under the 1972 Local Government Act, County Councils had, as described above, been made responsible for highways, and for developing comprehensive policies for a co-ordinated transportation system. Circular 104/73 "Local Transport Grants" published by the Department of the Environment sets out the objectives of the new system as being designed to:-

- i) promote the development and execution of comprehensive transport plans by the new County Councils and Greater London Council;
- ii) eliminate bias towards capital or current expenditure or towards particular forms of expenditure;

- iii) distribute central government grant in a way that reflects as far as possible the needs of an individual area;
- iv) reduce the degree of detailed supervision by central government on individual schemes.

County Councils were to submit annual programmes for the financial year ahead, and following four years, in the form of a comprehensive Transport Policy and Programme (TPP) covering both capital and revenue expenditure on highway improvements and maintenance and public transport revenue support and co-ordination. Having considered each County's "bid", central government, through its regional offices, would then "accept" a certain amount of expenditure as being the total justifiable for the coming year. Transport Supplementary Grant would be payable at a fixed percentage on all accepted expenditure over a given "threshold". The threshold has since generally been calculated by government on a per capita basis.

So the TPP is a comprehensive plan and a bid document. Because it covers all forms of expenditure it is also a corporate document. Thus the Department of the Environment Circular 60/74 (1974) stressed that the first year's submission should provide the foundation for the evaluation and development of comprehensive policies in later years. This emphasis on comprehensive policies and programmes carried with it overtones of earlier moves towards programme budgeting and PPBS (Planning, Programming and Budgeting Systems). (11).

In Britain PPBS was viewed with some reserve by managers. The Public Expenditure Group in the Treasury encouraged a few departments to try to create programme structures and categories and allocated personnel to one or two local government authorities introducing programme budgeting. When both endeavours proved unworkable the system was dropped - but one or two of its aspirations appear in the TPP process with similar results. Eddison observed "the idea of the system itself is basically sound. It is our capacity to fashion, develop and use it that gives rise to some concern." (1974, p.30). In spite of annual advice notes successive submissions of TPP's have

become merely bids for grant for a specific level of highway expenditure. Although supported by general policies and a programme of specific schemes, they have lacked a rational link between the two.

The situation has been aggravated by the economic deterioration since the system was introduced. Mackie (1980) has shown how the level of expenditure accepted nationally fell by 30% between 1975/76 and 1978/79 causing massive cuts in programmes, particularly for capital schemes. In later years also a greater measure of central control over the content of programmes was exercised associated with the public transport orientated policies of the Transport White Paper (Command 6836, 1977). Following its publication the Minister announced "I have been relatively more generous in expenditure allocations to those counties who appear to me to be observing the White Paper's priorities than to those who do not" (12). Thus the original objective of "reduced detailed supervision by central government" became suspect, and each TPP submission became something of a gamble to endeavour to find policies and programmes which would maximise the eventual receipt of grant.

Any grant system emphasises the dependence of local authorities on central government. It also enables central government to influence the policies and programmes local authorities adopt. The TPP system introduces particular uncertainties into the relationship, however, because the basis upon which acceptable levels of expenditure will be decided by the Department of Transport is unknown - the "rules of the game" are imprecise. Within authorities the corporate planning group preparing the TPP bid on behalf of the authority gained influence over line managers. These developments are explored more closely in the next chapter.

4.3.4. The Rayner Report

Trunk Road and Motorway programmes were not affected by the new TPP arrangements since the Department of Transport itself is the highway authority for these routes and determines programmes and levels of expenditure for their improvement, replacement and maintenance. The

Trunk Roads Act 1936 made the Minister of Transport responsible for a national system of routes to be known as Trunk Roads. For the next thirty years improvements, maintenance and construction of trunk roads were carried out by County Councils in which the schemes were situated, acting as agents to the Minister. By the mid-1960's the motorway programme was growing at 15% per annum and this pressure brought out the weakness and inefficiency of the agency arrangement then existing. In response to these difficulties the Road Construction Units organisation was set up in 1967 by Barbara Castle, then Minister of Transport.

Six government Road Construction Units were established covering the whole of England. They were operated as a partnership between the Department and the sixteen participating counties who supplied most of the staff on secondment. Under the participation agreement the RCU organisation was under the direct control of the Department which met all the costs. 81% of the staff in the six RCU headquarters and 96% of the staff in the county sub-units (3 or 4 per RCU) were local government officers. County Surveyors were nominated as Chief Engineers for their sub-unit, and thus became answerable to two authorities: the Department for Trunk Road and Motorway work, and County Members for County Road work. Despite this hybrid situation the new organisations worked well because of the common objectives of the participants, and the major part of the motorway programme was constructed during the RCU's 13 year life.

By 1980 £513m. of major trunk road and motorway work was under way and £3,500m. was in preparation - another 10 years' work, judging from the 1980 PESC forecasts. The immediate future of RCU's therefore seemed secure. A report by the National Economic Development Office (13) in 1979 showed that the cost to the Department of Transport "client" of using in-house RCUs to design its schemes was 84% of that of using private consulting engineers. Although these results were qualified, it was an encouraging result for RCU engineers. However, the 1979 Conservative manifesto undertook to achieve substantial savings by "the reduction of waste, bureaucracy and over-government"

(p.9). Shortly after the election, Sir Derek Rayner was appointed to investigate how savings could be achieved in the Civil Service. During the summer and autumn of 1979 a study team set up by the Minister of Transport was carrying out fact-finding interviews in order that they might "consider whether the existing largely in-house arrangements were still appropriate or whether more economical and efficient arrangements could be made for the promotion, design, management and supervision of trunk road and motorway schemes" (14). They submitted an interim report to the Minister, the Parliamentary Secretary, Sir Derek Rayner, and senior officials in the Department. After "cross-checking interviews" they submitted a final study report. On the instructions of the Minister their report was published in full (15) in February 1980 with a final section added after the study groups' conclusions to represent Sir Derek Rayner's views and the decision of the Minister.

The study group concluded that the RCU headquarters were a valuable asset to the "client" and that this specialised advice should be strengthened. They stated that there was no conclusive evidence that consultants were more economical and efficient than sub-units or vice versa. They cast doubt on the feasibility of returning to the old agency arrangements as the motorway programme ran down but also asserted that a massive reassignment of work to new teams (consultant or agent) would not be efficient. On balance they supported a phased transfer of work to consultants over time, tailored, sub-unit by sub-unit, to fit local circumstances.

The Minister agreed that this course should be adopted, but the "phased programme" became foreshortened as a subsequent "action study" proceeded. By 2nd October Sir Peter Baldwin, the Permanent Secretary to the Department of Transport was able to write to RCU staff informing them that the majority of schemes would be transferred rapidly to consultants who would be invited to take on the majority of staff engaged on the projects they acquired (16).

In Kent the situation was complicated by the fact that a peak of

motorway building was drawing to a close, while one of the two major schemes in preparation (to which it had been anticipated staff from site would return) the M20 Maidstone-Ashford project, had just been withdrawn from the Department's programme. Kent retained the other major scheme, the M25 Swanley-Sevenoaks but there was no work for 94 RCU staff. As a consequence the highways department found itself in a redundancy situation. Thus an investigation with economic objectives, strongly influenced by political objectives, produced an element of turbulence into the environment of the highways department. This was particularly so for the 94 affected but also among those in support sections of the organisation who had up until then provided them with services and resources. Previous inter-dependences were broken, and new links had to be formed. Once again, therefore, a major initiative in the authority environment brought about first a state of uncertainty, and second a period of network building while those involved endeavoured to regain their stability.

4.3.5. Local Government Planning and Land Act 1980

The Conservative election manifesto had not referred specifically to the RCU's but was able to move rapidly to dissolve them because they were employed directly on Department work. More specific reference was made in the manifesto to Direct Labour Organisations, employed by local authorities - and their lack of economy. "By comparison with private industry, local direct labour schemes waste an estimated £400m. a year". Morris (1978) produces this figure (p.33) on the basis that Direct Labour operatives are at least 25% less efficient than private contract labour, and with total expenditure on all forms of direct labour amounting to £1,640m. per annum, an annual saving of £410m. could be made by putting their work to private contractors. This ignores the fact that a considerable part of the £1,640m. relates to housing maintenance work for which no comparative output figures are quoted.

It is interesting to reflect that the Kent County Council set up its Direct Labour Organisation for highways in 1905 (17) following a

consultant's report on the waste and inefficiency of carrying out the task by contract. Generally DLOs were established for reasons of convenience, service and economy. Convenience because it is easier to pass orders direct to your own employee rather than through an intermediary. Service because he will be continually available for a variety of tasks and emergencies rather than negotiating his hire on each occasion. Economy because shortening lines of communication and cutting out middle men's profit should, other things being equal, yield the lowest price for the job.

It was the economic question which dominated debate in the 1970's. "Direct Works Undertaking Accounting" published by the Chartered Institute of Public Finance and Accountancy (CIPFA) in 1975 contained three main proposals for increasing the economy and competitiveness of DLOs. They were, first, that DLOs should be treated as trading organisations; second that tendering should be adopted in competition with the private sector for the majority of works contracts; and third, that charges to individual budgets should be on the basis of the valuation of work done rather than on actual costs.

The final report of the Department of the Environment's working party on the DLOs published in 1978 took and expanded the CIPFA recommendations and clearly became the foundation for later legislation. It stressed the concept of an authority's DLO working in a "contractor" relationship to the "client", and being required to make a return on capital employed. It recommended that highway work should be excluded.

Shortly after the 1979 election a Consultative Paper (18) was published adopting the proposals of the previous report, but giving greatly increased powers to the Secretary of State to constrain DLO activities. The subsequent Local Government Planning and Land Act 1980 contains these provisions in Part II. The objective is clearly to increase the economy and efficiency of DLOs by exposing them to competition from private contractors and to commercial accounting criteria. The unstated objective is to reduce the activities of DLOs

in the building and civil engineering industries. The Secretary of State declared " there is no doubt that these disciplines will lead to a contraction of direct labour activities as local authorities come to appreciate the relative costs and advantages of direct labour and private contractors". (Heseltine 1979, p.11).

The Act sets out accounting requirements (separate accounts are to be kept for different classes of work) tendering requirements (the Secretary of State to be able to define classes of work which could not be accepted by DLOs without competitive tender) rates of return to be made on capital assets (subsequently defined as 5%) and reporting requirements. If a DLO failed to achieve the prescribed rate of return in three successive years it could be wound up by the Secretary of State.

Although the Act was concerned with accounting and pricing matters, the process of implementing its provisions inevitably had a significant effect upon traditional local government procedures, structures and employees. In particular it imposed the profit motive (as a measure of efficiency) on direct labour management and staff who have previously considered their principal objective to be one of providing a service. Backed by legal sanctions, the accountancy provisions of the Act could not be circumvented by local authorities. However, there were a number of procedures they could adopt in allocating work to their D.L.O.'s or private contractors to minimise the impact of open competition on their own employees. Even when an authority supported the political objectives of the Act there were reservations about changing organisational structures to separate the "client" and "contractor" role within authorities. Therefore the conflict of objectives for managers continued. Dependent on their work for achievement needs satisfaction, many found the conflict and associated uncertainty difficult to bear, and opted for either service or profit goals. Structural change eventually became inevitable.

4.3.6. Legislation and Government Directives with Social Objectives

Social legislation and reports have not had such a major impact upon highway authorities and their officers, but have, none the less, had a significant influence on attitudes - particularly to public participation. It was suggested above that there is a dichotomy for governments between democracy and economy. The acts and reports discussed so far have had economic objectives, but there has been a parallel concern by successive governments with social/democratic objectives. In the highway field this has chiefly revealed itself as an endeavour to ensure that those personally affected by highway proposals should be able to participate in decision-making, be assured that their objections to published proposals are judged dispassionately, and that they should be adequately compensated should they eventually suffer material loss as a result of a highway scheme - to strike a balance, that is, between the economic benefit for the travelling public and the personal interests of individuals. The 1972 White Paper "Development and Compensation - putting people first" (Command 5124) opens:-

"The Government are committed to enhancing the quality of everyday life in Britain. In doing so a balance must constantly be struck between the over-riding duty of the State to ensure that essential developments are undertaken for the benefit of the whole community and the no less compelling need to protect the interests of those whose personal rights or private property may be injured in the process" (1972, p.5).

Endeavours to ensure that those in authority do not ride roughshod over the interests of the individual are at the heart of the democratic ideal, and of participation practice. Public participation in democratic decision making is a wider matter than (as it is frequently interpreted) public consultation. Arnstein (1971) points out that any form of true participation is power-sharing. Writing in the context of social aid programmes for underprivileged communities in the United States, he categorises degrees of participation on an eight-runged ladder:-

8 Citizen control)	
7 Delegated power)	Degrees of citizen power
6 Partnership)	
5 Placation)	
4 Consultation)	Degrees of tokenism
3 Informing)	
2 Therapy)	Non-participation
1 Manipulation)	

The detailed scope of each rung in relation to community aid programmes need not concern us here, but the general concept is relevant to all forms of participation, from one-way pressure by one group trying to manipulate an individual's decisions, through varying degrees of two-way communication and shared power in decision making, to total control by citizen groups concerned. The writer has suggested (19) that Arnstein's ladder can be adapted to relate more closely to participation in highway proposals as follows:-

- 8 -
- 7 Frustration
- 6 Litigation
- 5 Negotiation
- 4 Consultation
- 3 Information
- 2 Indoctrination
- 1 Pressurisation

The first two rungs are equivalent to Arnstein's "non-participation" and are the field of pressure groups and the media though on occasions highway authorities may come close to indoctrination in an effort to "sell" their schemes. The third rung, "information" is the most widespread and least personal form of participation. Many participation exercises do not get beyond this rung. The fourth step "consultation" is more personal and involves a genuine two-way communication between interested parties. This can develop into the fifth rung "negotiation", with increasing commitment by those in authority to a particular course of action, and an assessment by individuals of the cost to their personal interests. The sixth step, "litigation" can be of two forms: first a tribunal to assign compensation when negotiation has proved fruitless, and second, an inquiry to ascertain the strength of the authority's case, and the justification for individual's objective. The seventh rung "frustration", is the stage reached by objectors who disrupt public

inquiries and refuse to be moved from the path of oncoming bulldozers. It is reached when the previous six rungs lack credibility. There is no eighth rung in highway work at present. In social work Arnstein's eighth rung was "citizen control" - direct responsibility for social programmes. One cannot envisage private individuals taking over a road programme and ultimate power rests with the highway authority.

The acts and reports appearing during the 1970's having social relevance to highway work all relate to this ladder of participation. Public participation in development plan work is enshrined in the 1971 Town and Country Planning Act and the previous 1968 Act. These established the two-part framework for development plans: structure plans, covering policies and strategic proposals, and local plans to fill in the details for a particular area. In both the citizen is given the guarantee that adequate publicity will be given to the Report of Survey and to the proposals contained in the draft plan, that he will be made aware of his opportunities to make representation on these proposals, and that his representation will be considered by authority. Arrangements for ensuring that genuine participation takes place had been discussed in the Skeffington Report "People and Planning" (1969). It states "We understand participation as the act of sharing in the formulation of policies and proposals. Clearly the giving of information by the local planning authority and an opportunity to comment on that information is a major part in the process of participation, but it is not the whole story. Participation involves doing as well as talking and there will be full participation only when the public are able to taken an active part throughout the plan-making process". Skeffington was aiming between rungs 4 and 5 of the participation ladder.

The consultative processes enshrined in the 1971 Town and Country Planning Act were rapidly adopted, in modified form, for more specific highway proposals. Prior to 1973 an individual's only opportunity to make representation on trunk road or motorway proposals was at, or immediately preceding, the public inquiry into the various orders which would, if confirmed, establish the line of the road and confer powers

to acquire land for its construction (i.e. rung 6 of the ladder). There was increasing public dissatisfaction in the early 1970's with the nature and scope of these inquiries, and with the lack of opportunity to comment at an earlier stage. The response from the Department of the Environment was to issue Circular 30/73 "Participation in Road Planning" (1973). This established a new procedure for "informing people about alternative routes for trunk road projects and for obtaining their views about them" (i.e. rung 4 of the ladder).

Similar processes - though from a more flexible approach - are adopted for County highway schemes. The results for the highway engineers have been threefold. First, he has been brought much more closely in touch with the public, having to justify his selection of route against those personally affected by the scheme. Second, the need to assess and publicise all aspects of the scheme has brought him into a corporate exercise with transport planners, land-use planners, environmental assessors, and economists. Third, the need for an iterative process of consultation, analysis, decision, and re-consultation has considerably extended the preparation times for schemes and has made their eventual implementation less certain.

While this move towards greater consultation on highway schemes was under way, a parallel endeavour was being made to negotiate with, and compensate more adequately, those harmed by this form of development (step 5 on the participation ladder). The Department of the Environment publication "New Roads in Towns" (1972), the report of the Urban Motorway Committee, proposed a new approach to the planning of roads (including a comprehensive planning and participatory procedure such as that eventually adopted) and a series of legal, procedural, and financial changes (primarily to benefit those

personally affected by schemes). These legal provisions were subsequently developed and published as the White Paper already referred to "Development and Compensation - Putting People First" (1972). Powers would be provided to enable dwellings to be sound proofed where traffic noise from a new improved highway exceeded 68 dbA. In addition there would be rights of compensation to people whose property was injuriously affected by such highway works. Where property had to be acquired owners would be entitled to advanced payments and home loss payments to ease the difficulties of those affected. In particular the onus was placed on the highway authority to inform those who might be entitled to these benefits, and eligibility was back-dated three years.

These provisions were incorporated into the Land Compensation Act 1973. They had no significant and immediate influence on the highway engineer, though the Act certainly meant that he had to work closely with his valuation and noise assessment colleagues to arrive at an optimal line, and realistic all-in costs for a scheme, and also in his contacts with those affected by the scheme. Perhaps the influence has been technical/economic as much as social, but certainly the highway designer now has to pay greater heed to the impact of his scheme on individuals.

It remains to mention one other report which has implications for the ultimate form of participation - the public inquiry (step 6 in the participation ladder). The individual's right to register an objection to the department's proposals and appear at a public inquiry is enshrined in the 1959 Highways Act, though the history of this form of participation can be traced back to the Ministry of Transport Act 1919. Levin (1979) has described the transformation which took place in the course of public inquiries from the orderly affairs of the

1950's and 1960's to the chaos and disruption of a number of motorway inquiries in the mid-1970's. The disturbances stemmed from a body of determined and vociferous individuals, who, though in a minority, succeeded in bringing about a change in the scope of inquiries, and the responsiveness of the Department of Transport. One specific result was the Review of Highway Inquiry Procedures (Command 7133) of 1978. Prior to this review, inspectors for inquiries had been appointed by the Departments of the Environment and Transport from a panel of retired civil servants and local government officers. Since they were employed by the Departments and owed their continued (casual) employment to them their impartiality in reporting on the Departments' proposals was frequently called into question. As a result the Review recommended that the Lord Chancellor should in future be responsible for the appointment of inspectors and that more and better information should be provided for objectors. At the first two inquiries under the new rules (Swanley-Sevenoaks M25 and Accrington M67) there were lengthy wrangles over scope, which must have made it no less difficult or intimidating for an individual to make his views heard. Also the use of Q.C. as inspectors at these two inquiries did nothing to shorten their duration or the submission of their reports.

What it did do, however, and this is germane to this study, is mark something of a turning point in this ultimate phase of public participation. Partly due to the reduced motorway programme, but also no doubt to the increased credibility of the inquiry procedure, public debates of this nature into the pros and cons of motorway schemes have passed out of the public eye, and have returned to some extent to their previous unexciting but orderly process. This in turn has had its impact on social response to highway schemes. They are no more acceptable to those affected, but at least there is some consensus on the basis and procedures to be adopted for their implementation.

These three elements of Government action with social objectives, aimed by implication at the consultation, negotiation, and litigation steps in the participation ladder, had significant implications for engineers, particularly in their social environment at work. In particular it became increasingly difficult for them to distance themselves from those affected by their schemes. At the consultation stage they met them face to face at exhibitions and public meetings. At the negotiation stage they visited them in their homes and discussed the schemes in their solicitors' offices. At the litigation stage they sat with them through long hours of submissions and counter-submissions at public enquiries. What had been a remote and homogenous environment became a matter of personal acquaintance. Professionally this was no bad thing. The image of the highway engineer as an aloof bureaucrat was harmful to the profession, and damaging to its credibility and legitimacy.

However, the Government initiatives in the authority environment undoubtedly increased highway engineers' dependence in the social environment. They radically changed the rules of the game, slowing programmes, changing design premises, and requiring new skills. In doing so they made it more problematic whether the engineers would find satisfaction of their achievement needs by reducing their autonomy and increasing their dependence - on the public and on fellow professionals. Ironically it increased their professionalism by giving clearer emphasis to the personal service aspect of their tasks. It could well be, therefore, that those who have eventually carried their schemes to a successful completion have gained increased satisfaction in the process. This will be investigated further in Chapter 6.

4.4 CONCLUSION

In this chapter a number of general developments and specific changes in the economic, technical, social and authority environments of highway authorities have been examined. These must now be aggregated in order to consider the total influence of the environment on the organisations' action space over the last decade.

We have seen that the single, concentrated, dominant influence in the authority dimension has been central government. In addition there has been significant interdependence with district authorities under formal agency agreements. Government initiatives, backed by legislation, have had an immediate effect, changing tasks or procedures, and hence organisational structures and systems. Although it has been possible to adopt strategies to mitigate the change in action space boundaries (discretion) due to these interventions, the effect has been significant - enlarging county action boundaries under the 1972 Local Government Act, reducing them with the abolition of the R.C.U.'s in 1980, adjusting objectives (which define them) under the 1982 Act. Due to the political philosophy underlying much of this legislation elected members and senior officers at the authority boundary of highway authorities have seen the authority environment become turbulent, with both changing "rules of the game" and imposed organisational changes heightening uncertainty.

The County-District authority link has been more problematical. For Districts the link to the Department of Transport is indirect, and District-County agency links for highway work have lacked the legal sanctions of County-Government relationships. There has accordingly been continuing negotiation at the intersecting boundary of County-District action spaces. Districts have been dependent on the County

for resources while the County has been dependent on them to carry out its highway tasks in urban areas. This room for manoeuvre has introduced variability into this sector of the authority environment. To the extent that the County allocate this sector to one group of its staff, the resultant uncertainty is contained. Whether between County and Districts, however, or County and Government ministries, the object of negotiation and bargaining has been to minimise reductions in action space boundaries.

In the technical environment, influence is more dispersed, and change has accordingly been more gradual. It is a complex environment, but highway authorities segmentalise it so that one group deals with the transportation sector, one with the structural design sector, one with highway design, and one with materials. Although each of these sectors is variable, multiple links from it to its sub-environment achieve a good flow of information into the organisation and minimise uncertainty. The Department of Transport and research establishments such as the Transportation and Road Research Laboratory, or Cement and Concrete Association are major influences in the environment with formal and informal links to the authority. In addition there are a multiplicity of personal and informal links to professional institutions, the trade, the press, and universities. Specialists in each of the groups span the boundaries with the technical environment and gain influence accordingly. Middle managers have, in some cases, lost some of their contacts with the environment and for them the uncertainty brought about by technical changes can be intense. Some resolve their difficulty by concentrating on day-to-day management and hiving off responsibility for technical innovation to specialist groups. Senior management are equally dependent on specialist advice, but achieve greater stability through their more formal institutional links to the technical environment.

Unless subject to Government directives there have been few sanctions in these multiple links. It is in many cases the professional enthusiasm of individual engineers, and fresh concepts brought from universities by graduates which have initiated technical changes. The ever-increasing use of computers has in itself brought change in concepts and practice due to the vastly improved handling and generation of information which has resulted.

The technical boundary of the highway authorities' action spaces has therefore been in a state of flux - expanding in technique as a means to an end, but relatively static in terms of ultimate objective. Out into the environment the links are very complex but the lack of dependence in these links reduces the uncertainty for the organisation as a whole. We have seen too that the environment itself is differentiated into traffic, design, and materials sectors which reduces the complexity for the organisation when a corresponding degree of differentiation exists within its structure. We will see in Chapters 5 and 6 that some degree of uncertainty and conflict arose among County and District officers when increasing interdependence between groups was not matched to the same degree in the sectoring of the environment.

Organisations have experienced increasing illiberality in the economic environment. They have endeavoured to minimise the impact upon their total action space by seeking alternative sources of finance, concentrating on projects with more certain funding, and vigorously reviewing the cost of schemes relative to their benefits in achieving organisational objectives. For the majority of organisational members the economic environment has been ill-defined and "out there" until realised in Expenditure White Papers or annual budgets. Boundary-spanning is at the "institutional" (to use the

terminology of Parsons, 1960) level of the organisation where members hold positions in the inter-authority network as local authority representatives or specialist advisers.

Inevitably the most complex characteristics are exhibited in the social environment. A dense web of personal relationships bind the organisation to society. By influencing members values and motives these indirectly influence the organisation. There remains considerable diversity in the links of individuals acting as representatives of the organisation to the social environment. To some extent the organisation segmentalises its social environment and the perceived uncertainty of these sectors varies with its heterogeneity, and the impersonality of the content. We have seen that those concerned primarily with the "travelling public" tend to see the environment as relatively certain, homogeneous, and subject to low rates of change. Contact is with representative bodies such as the motoring organisations and freight associations. It is the police who have contact with the travelling public as individuals in enforcement activities and at the scene of accidents.

Maintenance staff relate to a different segment of the social environment. They are concerned with the static, resident population. The environment is heterogeneous - ranging from "the ratepayers" to an individual resident bitterly complaining about a pot-hole at his gateway. An attempt is made to limit the resulting uncertainty by introducing "channels of communication", standard responses, and limited autonomy in executing minor works of purely local significance. Identification with the local viewpoint can cause conflict for these boundary-spanning personnel with headquarters staff. Certainly there is a measure of inter-dependence in these local links. Not only can an irate ratepayer take an inordinate amount of time to placate, but he

can also escalate the problem to his elected representative if not satisfied. This is an interesting aspect of the organisation's social links - they originate at both ends of the hierarchy, separated inevitably by differing perceptions of organisational objectives.

Highway design staff have been strongly influenced by the range of Government legislation and directives described above as having social objectives. Participation - whether at the consultative, negotiative, or litigative level - has been a novel experience for many engineers, increasing the range of criteria determining adopted solutions. For the duration of a project they have the most specific contacts with the public. The period can extend to ten years, and until the Secretary of State finally confirms the Statutory Orders to acquire land and establish the road layout the outcome is uncertain. Project monitoring techniques are adopted by authorities to reduce uncertainties in works programmes, but these do nothing to minimise the frustration of an individual engineer, or his sense of satisfaction when the scheme eventually commences.

The social boundary to organisational action space is, therefore, diffuse and variable. There is continual negotiation with individuals and groups at the boundary, with strong implication for achievements in the technical dimension. More fundamentally, lack of compromise along this boundary would eventually lead to a loss of institutional support or legitimacy for the organisation, which would feed back through the authority environment. Clearly, therefore, there is interdependence between the environments of an organisation. The model of a highway authority's action space which has been represented here shows similar interdependence at the boundary. We have seen that the action space is constrained along the authority boundary by government initiatives and district relationships, is expanding along the technical boundary under

the influence of multiple links to the environment, and is consolidating along the social boundary with increasing interaction with individuals and pressure groups. Contraction along one boundary has repeatedly been balanced by expansion along another as individuals and organisations alike endeavour to protect the total "volume" of their action space. Changes in the authority's action space boundaries will cause associated changes in the organisation's social, technical, or economic environments, reinforcing environmental interdependence. For the purpose of this analysis, however, it has been of value to break down the environment in this way and consider how the sub-environments have been linked to and have influenced the focal organisation over the last decade.

The next stage in our investigation must be to consider how local highway organisations have adapted their structures and activities to cope with these changes in their external environments. Finally we will examine the impact of these changes on individuals within the organisation to determine how they have adapted to changing values, expectations and objectives.

Notes to Chapter 4

1. For a comprehensive review of the current position regarding highway condition surveys and data handling see "Proceedings of the Symposium on Highway Maintenance and Data Collection" (13th, 14th July 1983), Department of Civil Engineering, University of Nottingham.
2. The Department of Transport requires the net present value of capital investment in highway projects to be assessed using the computer program COBA. This is described in the Department Memorandum H5/73 "The COBA method for the economic appraisal of inter-urban road schemes" published 27/3/73.
3. Limit state methods of design are employed in BS 5400 "Code of Practice for the Design of Bridges" (British Standards Institute 1978 (parts 1,2,4), 1979 (part 5), 1982 (part 3). The use of this code for County design work is regulated by Department of Transport memoranda BD 1/78, BD 13-16/82, and BD 17/83.
4. "Method of Measurement for Road and Bridge Works", Department of Environment 1971. HMSO.
5. "Conditions of Contract and forms of tender, agreement, and bond for use in connection with works of civil engineering construction", 5th edition 1973, revised 1979. The Institution of Civil Engineers, London.
6. Computerised Highway Assessment of Ratings and Treatment (CHART): see P.J.F. Wingate and C.H. Peters "The CHART system of assessing structural maintenance needs of highways". Transport and Road Research Laboratory Supplementary Report 153 UC.
7. Maintenance Assessment, Rating, Costing of Highways (MARCH): see G.R. Wilson "The why, how and when of the MARCH system" PTRC Spring School 1976.
8. The SCRIM machine measures the skidding resistance of carriageways: see J.R. Hosking and G.C. Woodford "Measurement of Skidding Resistance", Transport and Road Research Laboratory Reports LR 737, 738, 739.
9. The Deflectograph machine, developed by the Laboratoire Central des Ponts et Chausees, France, and widely used in this country, assesses the residual strength of a carriageway by measuring its deformation under a passing wheel load. See N.W. Lister "Deflection Criteria for Flexible Pavements". Transport and Road Research Laboratory Report LR 256.
10. "Urban Transport Planning". 2nd report from the Select Committee on Expenditure 1972-73. HMSO 1973. H.C. 57 Vol. 1.
11. Introduced into the American Department of Defence in 1961, PPBS spread like an epidemic. Writers such as Wildavsky (1974) and Merewitz and Sosnick (1971) have drawn attention to the impracticability of PPBS for positive decision making because of the problem of identifying needs, defining objectives, selecting priorities, and finding efficient means to achieve goals. Above all, the basic problems are not amenable to comprehensive rational

analysis and categorisation.

12. Department of Transport press notice 472. 16/12/1977.
13. "Design and Export: the better use of design resources for meeting the needs of UK clients and earning foreign currency". National Economic Development Office. London. HMSO 1978.
14. Report of the study of road construction units in consultation with Sir Derek Rayner for the Ministry of Transport" para. 1.1. Department of Transport 1980.
15. Ibid para. 1.7.
16. Letter from Sir Peter Baldwin KCB to all staff in road construction sub-units 2/10/1980.
17. E. Melling "History of Kent County Council", Kent County Council 1975.
18. Department of the Environment: Consultative Paper, Sept. 1979.
19. J.A. Bergg "Public participation on highway proposals - the pros and cons". The Chartered Municipal Engineer, Dec. 1980 (Vol. 107, No. 12).

CHAPTER 5

ORGANISATIONAL CHANGE IN LOCAL HIGHWAY AUTHORITIES

5.1. INTRODUCTION

The environmental changes described in the last chapter were by no means trivial. They included the most significant reorganisation of local government in this century, the conclusion of the post-war major road building era (and the associated abolition of the Road Construction Units), a period of national economic difficulty, a dramatic increase in heavy lorry traffic, and public questioning of the justification for road building expenditure. One would anticipate that major structural change would have been necessary if local highway authorities were to remain effective. We will therefore wish to examine in this and the next chapter the extent to which the environmental changes described in Chapter 4 brought about organisational changes of this nature and also the extent to which they were accommodated within existing structures - though with changes in dependence and power in the network.

Local authorities are established by statute, and have certain functions assigned to them by Society. Initially this sets the authority (and to some extent social) boundary of their action space. The organisational structures of local authorities are means to the end of directing, coordinating and accomplishing those functions. The functions themselves are a means to achieving the higher order goals of the organisation. Therefore in considering structural change and adjustments within the local highway organisations, it is necessary first to outline the statutory duties and powers under which they act, to consider how these duties are translated into formal statements of highway objectives and then relate them to the (often prosaic) activities which organisation members actually carry out.

It will then be necessary (if later examination of individual's perceptions is to have meaning) to consider in some detail the grouping of those activities within county and district departments, making particular mention of the changes which have taken place in formal structures in the past decade. The new relationships of county and district authorities will be particularly significant in this respect, together with the changing role of elected members within those authorities in relation to their professional advisers. The chapter will conclude with a more general review of the changes and adjustments that have resulted in the multiple networks of the local organisations, arising from changes in their external environments and also from internal pressures by individual members.

5.2. STATUTORY DUTIES AND POWERS

As noted earlier (Chapter 4) the Local Government Act 1972 made County Councils the highway authority for all roads in their areas other than Trunk roads and Motorways. The Highways Act 1980, consolidating and updating the provision of the earlier 1959 Act, placed upon highway authorities the duty to maintain their highways (sec. 41), to free them from obstructions including snow (sec. 150), and to protect the public's right to use highways (sec. 130) and their safety in doing so.

In fulfilling this duty the highway authority is given wide powers to acquire land by compulsory purchase (sec. 239, 240, 250), to create new highways (sec. 24) and otherwise to maintain, manage and improve the existing road system.

In parallel with this duty to protect and develop the physical highway system, the highway authority also has a duty under the Road Traffic Regulations Act 1967 to ensure that the traffic moving on the

network is able to do so safely and expeditiously (sec. 84). Again powers are conferred on authorities to carry out this duty by traffic regulation orders (sec. 1), traffic control schemes (sec. 5), traffic signs (sec. 54) and speed limits (sec. 71).

An increasing emphasis on road safety led to the Road Traffic Act 1974 which places upon relevant local authorities the duty to monitor and study road accidents, and promote programmes to enhance road safety, including physical works and advice and training for road users.

Growing intervention to preserve and enhance public transport is reflected in the Transport Act 1968 which enabled County Councils to make grants to support passenger services in rural areas, and the Transport Act 1978 which strengthened the County role as coordinator of public transport for their areas via the annual Passenger Transport Plan.

Legislation therefore reflects the dichotomy between a highway authority's duty to maintain, protect and enhance the fabric of the highway, and to manage and facilitate its use by the travelling public.

5.3. OBJECTIVES AND POLICIES

In Kent, the dichotomy between duties relating to roads and traffic is reflected in various statements of the County Council's objectives as highway authority. The Kent Structure Plan (1) stated that "the County Council's primary transportation objective is the provision for the safe mobility of the present and future population of the County and of other users of its transport system, of their goods and services, whilst safeguarding the environment of the inhabitants". Five secondary objectives were identified: the optimum use of

resources, higher standards of road safety, a minimum standard of mobility for all, minimum damage to the environment from traffic movement, and the improvement of inter-urban communication with the reduction of urban traffic delays. Twenty-four policies followed of which only one concerned the maintenance and improvement of the highway network.

This emphasis on traffic rather than highways is perhaps inevitable in a strategic planning document, and it contrasts with the stated objectives of the County Council Highways and Transportation Department formalised at the time of local government reorganisation in 1973/74. Prior to 1974 the department had been called the Roads Department. In his first Annual Report to the Planning and Transportation Committee after reorganisation (2), the County Surveyor, A.D.W. Smith, wrote that "the new title of the Department is by no means a mere renaming of the old Roads Department: the County Council's new function as a Transportation Authority has brought responsibilities much wider than the provision and maintenance of roads". Nonetheless the objectives for the new department quoted in an earlier report (3) to the (shadow) Planning and Transportation committee of the new County Council retained a "roads" emphasis. The primary objective is stated to be "to plan, provide, manage and maintain a system of highways for the safe and expeditious movement of people and goods and to protect the inhabitants of Kent from unnecessary environmental damage from road traffic". Four secondary objectives were identified: to maintain existing highways, to improve existing, and provide new highways and bridges; to plan for new highways and achieve efficient use of existing roads; and to protect the public in respect of highway matters. For many years the "traffic" emphasis of County policy documents predominated. Successive

Transport Policies and Programme (TPP) submissions reiterated the structure plan version of the objectives. The submission for 1979-1980 (4) did so, and also enumerated 49 policies according with the primary and secondary objectives, only four of which had to do with the improvement and maintenance of the highway network.

The author's commentary on these objectives and policies and their relevance to officers in the highway authority (5) had some impact in revising the objectives in subsequent years. The latest submission of the TPP (6) refers to three primary transportation objectives:-

- (i) to contribute to economic growth and higher national prosperity through providing an efficient service to industry, commerce and agriculture within the framework of the County Development Plan;
- (ii) to meet social needs by securing a reasonable level of personal mobility and
- (iii) to minimise the harmful effect in loss of life, personal injury, and damage to the environment that can be the direct physical result of the transport we use.

These three objectives support the Council's main strategic planning objective of encouraging the growth of industry and commerce whilst safeguarding the County's character and built environment.

Five main policy areas for action follow which have direct relevance to the activities of the department:

- (i) arresting the declining structural condition of county highways;
- (ii) safeguarding the capital asset of the existing road network;

- (iii) investing in road improvements to reduce accidents and delay and safeguard the environment;
- (iv) encouraging efficient public transport operation and providing revenue support for socially essential services;
- (v) investing in road improvements where this can have an encouraging influence on industry and job promotion.

Statutory duties, objectives and policies, constrained by resources available for these purposes, set bounds to the highway authorities action space. Activity in pursuit of these ends lies within the action space.

5.4. HIGHWAY ACTIVITIES

Clearly the County's published goals and their relative emphasis on highways or traffic have been changing since 1974. The activities within the authority and the allocation of actual expenditure have not reflected these changes to a marked extent. A highway authority provides a service, in response to its statutory obligations. Its "customers" are the travelling public and its "plant" is the highway network. It is the authority's duty to maintain and enhance the plant to meet the customers' needs, whilst pursuing a good neighbour policy to those who live in the vicinity of the plant. As a service organisation there is no clear cut product, but one can identify a number of functions required to maintain and improve the service. The prime engineering functions are to maintain, improve, or replace the plant. The Marshall Report on Highway Maintenance (7) referred to in the last chapter, took maintenance to mean those activities designed to preserve, rather than to improve the highway. It differentiates between three categories of works: maintenance of the structure, aids

to movement and safety, and amenity work. The second and third categories are jointly known as cyclic maintenance, because of their periodic and repetitive nature, as opposed to the first, structural maintenance. Maintenance of the structure includes resurfacing, reconstruction and strengthening, surface dressing (8), patching and repairs to drainage, footways and bridges. Cyclic maintenance includes aids to movement and safety such as snow clearance, and the maintenance of carriageway markings, signs, signals and lighting, together with amenity works such as grass cutting, tree-maintenance and highway sweeping. Traditionally these activities, for which the degree of engineering skill required clearly varies, have been carried out by the authority's own manual employees - by, that is, "direct works".

The improvement and replacement of the "plant" can include everything from a short length of new footway, or a new mini-roundabout within the limits of the existing highway, to a new motorway. Smaller improvements are designed to improve sites with accident or congestion problems, such as junctions, bottlenecks and sharp bends. More significant works are required to improve a length of road which is below capacity, or to bypass a local community. Major works are involved when complete routes are replaced, villages bypassed, or major new elements of urban infrastructure provided. Alternative solutions to vehicle conflict at junctions or urban congestion are traffic signal schemes, comprehensive traffic control measures and traffic management measures to obtain optimum use of the existing highway network.

When referring to the maintenance and improvement of roads one must include bridges, since these are essential components of the highway facility. On major schemes, junctions with side roads are eliminated by bridges over or under the new route, and the stock of bridges to manage ranges from medieval masonry bridges (many of them

the responsibility of the Counties since the 16th century) to modern long span steel and concrete structures. This range of tasks results in differentiation within the engineering function.

The engineering functions to preserve and enhance the "plant" are matched by a "market research" function to analyse and forecast traffic needs and growth, and plan for its accommodation. This planning and analysis function overlaps with land use planning on one hand (because of the dependence of traffic flows on land use, and the constraint which highway capacity places on new development) and on physical traffic management measures and traffic control systems on the other.

To facilitate these activities a number of support functions are required - providing testing and investigation work for the engineers, data for the planners and information for managers.

Each function embraces a range of managerial and operational roles and the range of functions has, over the years, produced a variety of specialists. The development of organisational structure has been marked by the progressive separation of these specialised roles into separate groups or branches.

5.5. ORGANISATION WITHIN COUNTY HIGHWAYS DEPARTMENT UP TO 1974

The core highway function of the County Council since it was established in 1889 has been the maintenance of highways and bridges. The first County Surveyor was a practising architect who designed the first County Hall. He had four divisional surveyors who travelled the County in a variety of conveyances supervising the work of the contractors who were responsible for all highway works. The shortcomings of the system soon became apparent. A report was commissioned by the County Council in 1902 (9) and as a result the

first full time County Surveyor and a staff of 7 were appointed. They began to build up a direct labour organisation to maintain those roads for which the County was responsible. These were the main roads, most of which were old turnpike roads. Responsibility for the remainder was shared among the County's 61 urban, borough, county borough and rural authorities. Although the rural districts lost their powers over highways in 1929 (10) the County entered into delegation agreements with them, and the situation remained little changed, although the County Council had rather more control over the rural districts highway activities. Thus in 1932 the third County Surveyor was able to describe himself (11) as responsible for the work of 1752 individuals - 67 county staff, 783 county roadmen, 22 rural district surveyors with delegated powers and 880 rural district roadmen.

At that time the County Roads Department (Fig.5.1) centred round the maintenance activity. Work on the ground was carried out by four maintenance divisions, employing 623 roadmen, and supported by administrative, transport and technical groups. As well as supporting the maintenance activity the technical group was undertaking the construction of the Faversham to Thanet coastal road (A299) and had responsibility for the embryonic town planning and development control activities. It had a staff of 21.

By 1973 the County Roads department had grown dramatically. The staff had expanded from the 1932 figure of 67 to 574 (12), whilst 838 manual workers were employed. There had, of course, been major changes in the interim, principally the explosive growth in motor traffic after the war. Delegation arrangements with rural districts ceased in 1948 and a phase of major road construction commenced in the early 1960's. This accelerated in 1967 following the establishment of

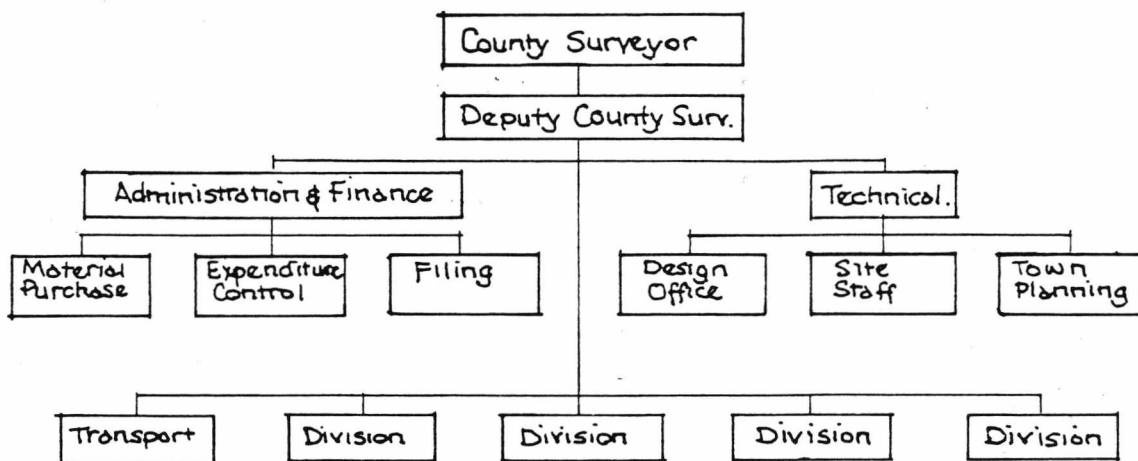


FIG 5-1 KENT ROADS DEPARTMENT 1932

Source : Chapman (1932)

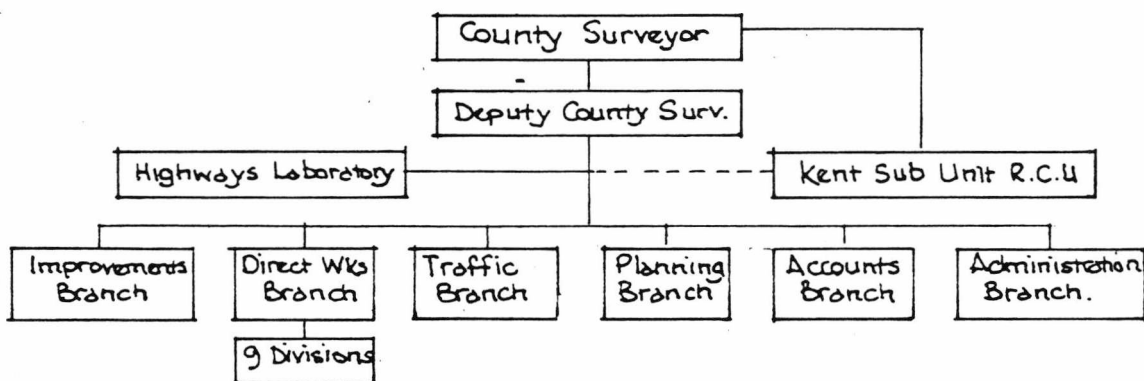


FIG 5-2 KENT ROADS DEPARTMENT 1973

Source : K.C.C. Records

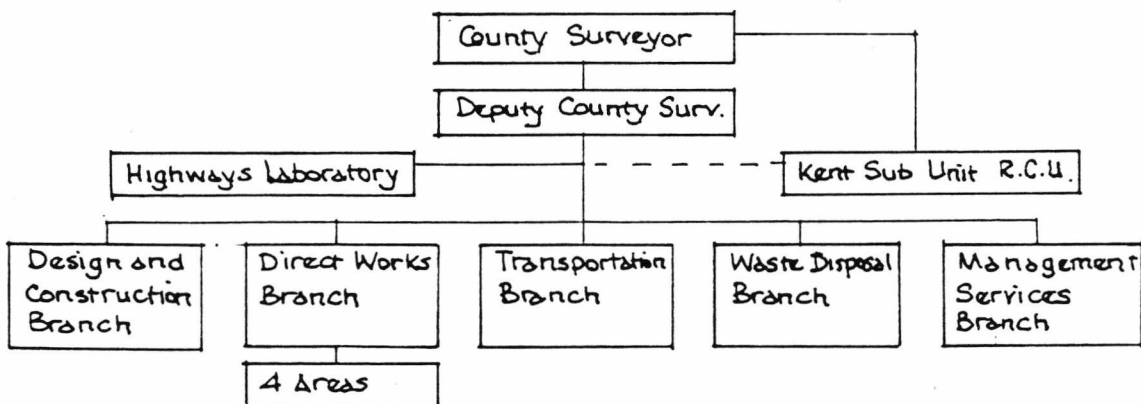


FIG 5-3 KENT HIGHWAYS & TRANSPORTATION DEPT. 1974

Source : K.C.C. Records

Road Construction Units, with a sub-unit in Kent staffed by engineers employed by the County.

Organisationally the principal development during this time was the growth of strong, nearly autonomous branches out of the groups which originally provided support to the activities of the maintenance divisions (Fig. 5.2). By 1973 there were nine divisions grouped into the Direct Works Branch. The technical group of 1932 had grown and divided into an Improvements Branch (capital works), the Kent Sub-Unit of the Road Construction Unit (motorways), a Transportation Branch (traffic engineering and transport planning) and a Planning Branch (development control and land changes). The earlier administration and finance section had become an Accounts and Management Accounting Branch and an Administrative Group. A strong Highways Laboratory had been established to provide site investigation and materials testing services.

This overall structure was little changed by reorganisation in 1974. A new branch was established to carry out the County's new Waste Disposal activities, and the accounts branch and administrative group were amalgamated to form the Management Services Branch (Fig. 5.3). Apart from this new function, and rationalisation of management support activities, the functions of the various branches were little changed and the pre-1974 specialisation and differentiation was retained. The wider responsibilities of the new County Council as highway authority for all county roads (albeit with agency arrangements with all 14 new districts) were recognised by modification to the hierarchy and activities of individual branches.

The Management Services Branch comprised four elements supporting the work of departmental management (Fig. 5.4). A new computer systems

KENT HIGHWAYS & TRANSPORTATION DEPARTMENT 1974

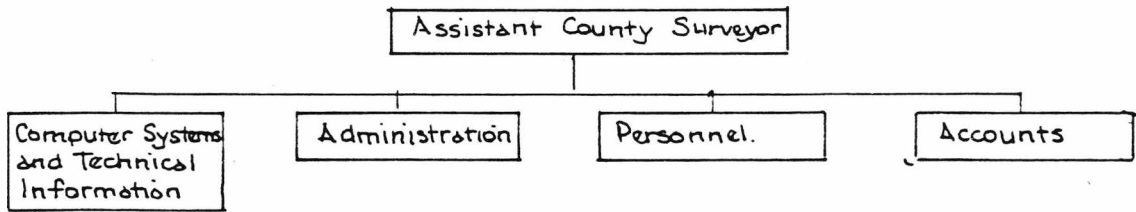


FIG 5-4 MANAGEMENT SERVICES BRANCH

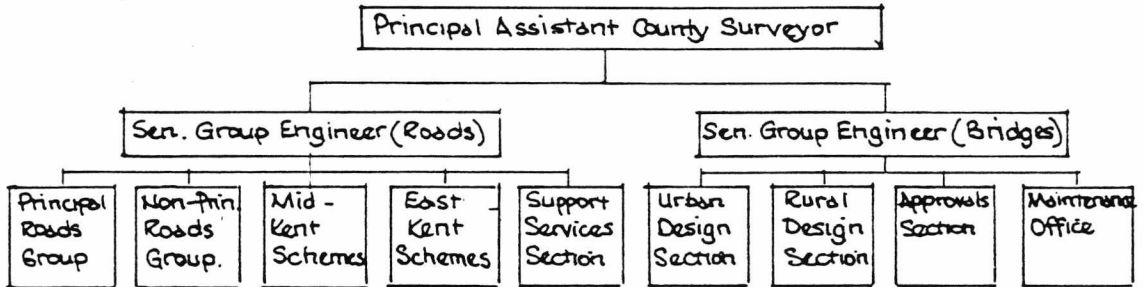


FIG 5-5 DESIGN AND CONSTRUCTION BRANCH

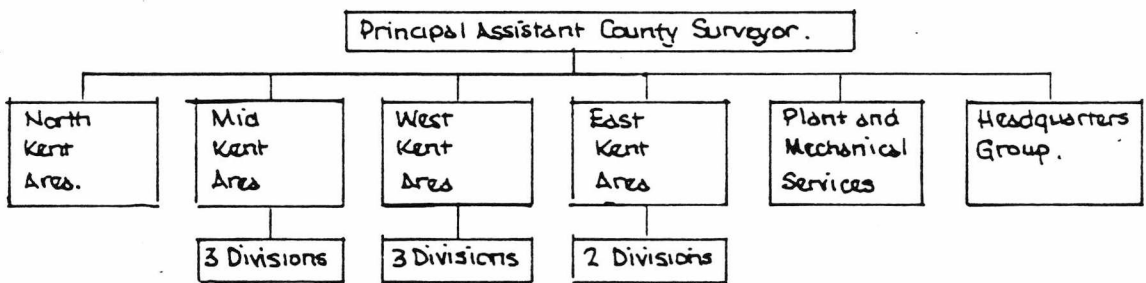


FIG 5-6 DIRECT WORKS BRANCH

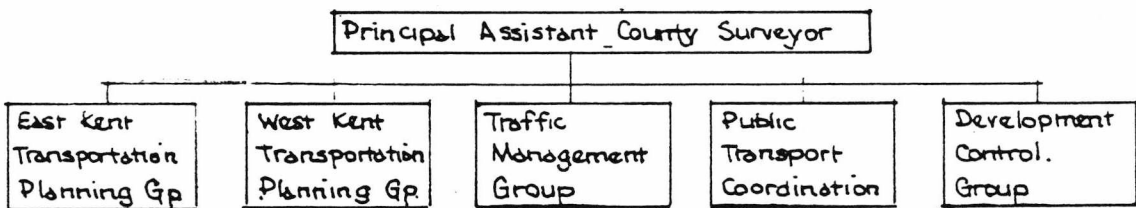
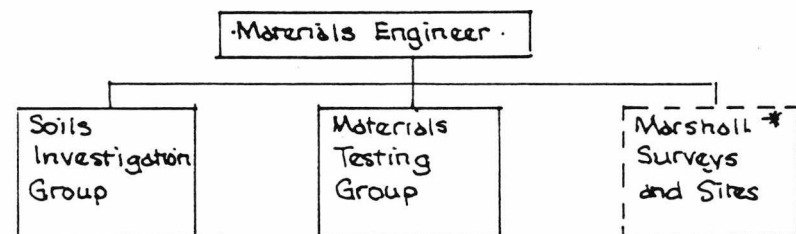


FIG 5-7 TRANSPORTATION BRANCH



* Being Established.

FIG 5-8 HIGHWAYS LABORATORY

and technical information group was to provide a programming, data processing, and contract measurement section together with the development of management information systems. The administration group provided the traditional typing and filing services but with personnel services (including training) placed under the responsibility of a new Personnel Officer. The management accountancy group was little changed with sections responsible for wages and plant, contracts and stores, insurance claims and annual tenders, though with a strengthened section to monitor costs, both in the county and agency areas.

The design and construction branch (Fig. 5.5) was divided into the two main specialisms of highway design and bridge design. Further subdivisions were by nature of highway schemes (minor schemes on principal roads and non-principal roads and major road schemes in east and west Kent), and by nature of bridges activity (bridge maintenance and repair, design approvals, urban design and rural design). There were also small sections providing land acquisition, tracing, and plan printing support.

The branch was responsible for the conception, design and construction of highway schemes varying in scale from minor footway works to major trunk road works and county bypasses, and of bridgeworks ranging from minor culverts to major highway and river crossings. Maintenance of the County stock of bridges, built in all periods since the middle ages and in all constructional materials was then and remains a major commitment. The branch included a small direct labour group specialising in the maintenance and reconstruction of these structures. Their responsibility extended over the whole county as there was no agency agreement for bridges.

The Direct Works Branch (Fig. 5.6) had been most affected by reorganisation since it has become responsible for the activities of District Councils engaged in highway work under the recently signed agency agreements. This was predominantly for the cyclic and structural maintenance of the roads but included some improvement and traffic management work. When proposals for the new organisation were being drawn up in 1973 the County Surveyor had proposed dividing the County into four Areas, with local offices staffed by engineers responsible for all roads in the Area. Works would be carried out by agency staff or county staff and highway divisions. Area activities would be supported by a headquarters group and a plant and mechanical services group. In the event this proposal was not accepted, leaving improvement work with Design and Construction Branch, traffic management with Transportation Branch, the divisions still primarily responsible for the maintenance of county roads in non-agency areas and a skeleton Area office staff acting in a predominantly coordinating role. This placed the new Area Surveyors in some difficulty in fulfilling the role specified for them. Overall, however, the branch had responsibility for a wide range of activities, including the management of direct labour, the maintenance and repair of plant, the programming and implementation of cyclic and structural maintenance works and the overall coordination and control of works programmes by County and District staff.

The new Transportation Branch (Fig. 5.7) embraced the work of the old planning branch on development control, private streets and land change. Control of new development was becoming increasingly dependent on highway advice, and District Councils were obliged to accept County direction in this respect for planning applications with implications for primary and secondary county routes. The County's new

responsibility for coordination of public transport was recognised by the establishment of a specialist group for this purpose, but the principal activity in the branch was in transport planning. Two groups looked after major studies underway in various parts of Kent, and the preparation for the newly inaugurated Transport Policy and Programme documents. The traffic management group was concerned with minor traffic management measures and orders, accident studies, signs and lighting.

The Road Construction Sub-Unit was, like the Design and Construction branch, divided into highway and bridge groups with staff below this level allocated to some 10 major trunk road and motorway proposals at varying stages of development and construction.

The Waste Disposal branch had little involvement with the highway activities of this department, and continues to follow an independent existence today. For this reason it is not considered in detail in the subsequent discussions.

The Highways Laboratory (Fig. 5.8) had two principal groups. The first was concerned with preliminary and detailed investigations of soil conditions along the lines of future highway works, reporting on the stability of future earthworks, and the bearing capacity below bridge foundations. It was heavily engaged in the RCU Sub-Unit's motorway design programme. The second group provided the corresponding service for works under construction by testing materials to be incorporated into the projects and during construction to ensure that they complied with the specification. It was also intended to set up a section concerned with the inspections required by the Marshall report.

Thus the impact of the 1972 Local Government Act was to consolidate the existing branch structure, and formalise the specialist

units across the department under the umbrella of existing branches.

The subsequent change in strengths in these branches is shown in Figure 5.9. This shows staff in post each year, rather than approved establishment since there was generally a marked shortfall in the former.

5.6. CHANGE IN COUNTY HIGHWAYS DEPARTMENT STRUCTURE 1974-1983

During the decade following reorganisation the basic pattern of the department remained virtually unchanged. By 1983 (Fig. 5.10) the only significant changes were the disappearance of the Road Construction Sub-Unit (following the Minister's decision to transfer the bulk of this work to consulting engineers in 1980) and the establishment of a separate finance branch from the support services branch. This was the culmination of a progressive reduction in the functions of the management services branch established in 1974. Most branches had, in the interim, developed their own computer support sections, and contract documentation and measurement work had transferred to the Design and Construction branch. Finally it was decided by Members that financial control in the department required strengthening (13), and a finance manager was appointed to lead the accounts staff previously in the management services branch. Thus a multidisciplinary management support group had, over the years, become differentiated into separate specialist groups. Throughout this time the branch had tended to emphasise the "service" rather than "management" aspect of its title. A more positive role in providing a lead to management in the planning and monitoring of resources might have avoided the break-up of responsibilities.

The Design and Construction branch changed little over this period (Fig.5.11). The geographical grouping of activities had come to

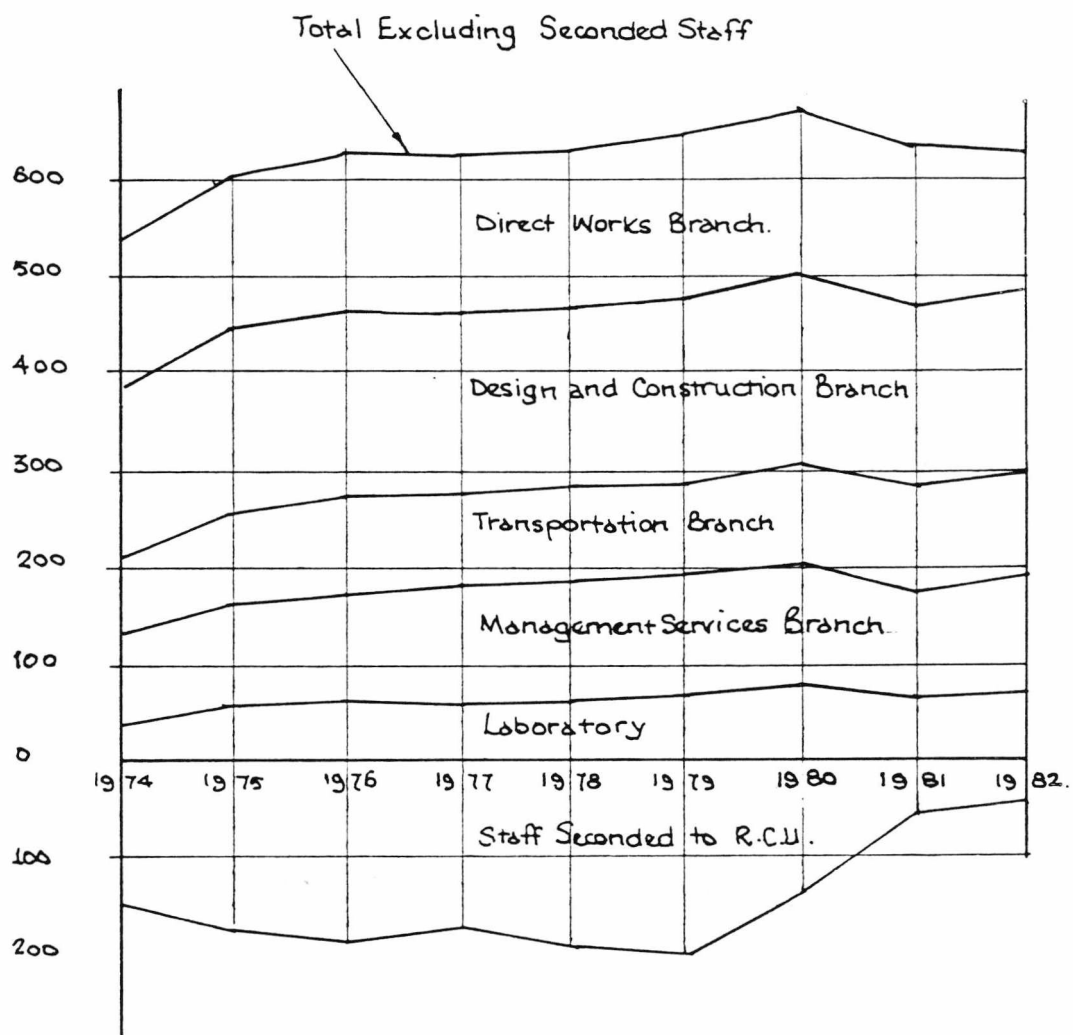


FIG 5-9 K.C.C. H.&T. DEPT. CHANGE IN NUMERICAL
STRENGTH OF BRANCHES 1974 - 1982

Source : K.C.C. Manpower Budgets

KENT HIGHWAYS & TRANSPORTATION DEPARTMENT 1982

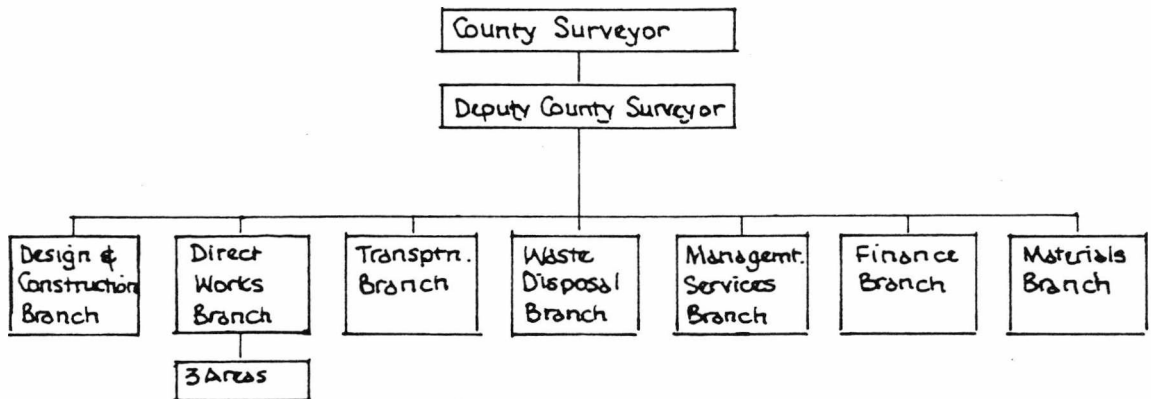


FIG 5.10 OVERALL STRUCTURE

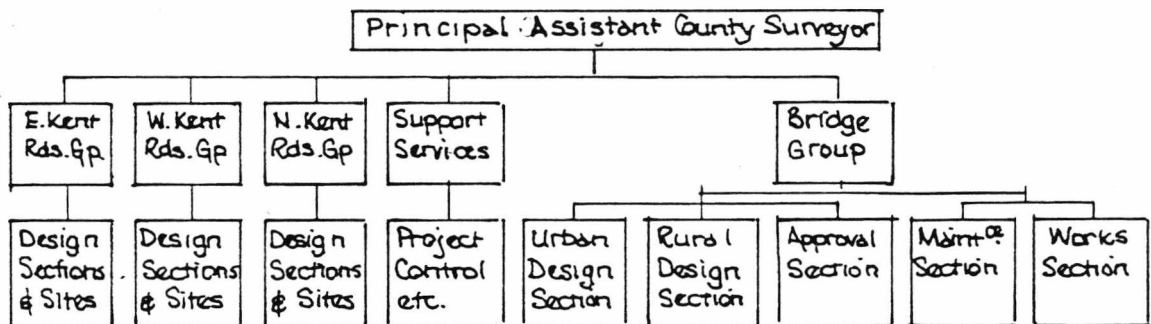


FIG 5.11 DESIGN AND CONSTRUCTION BRANCH

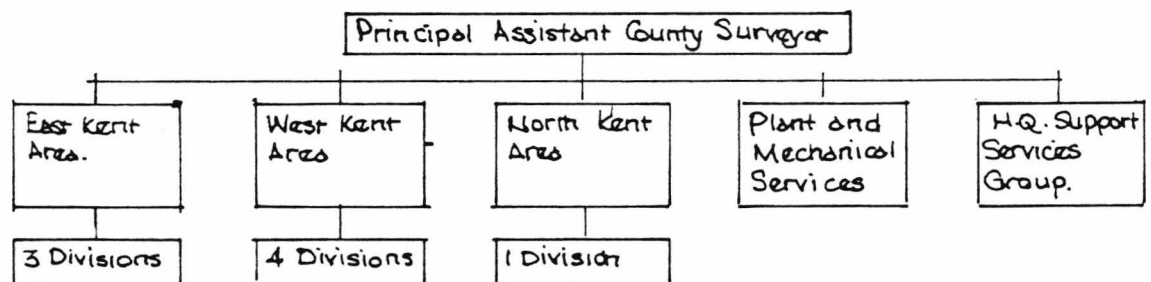


FIG 5.12 DIRECT WORKS BRANCH

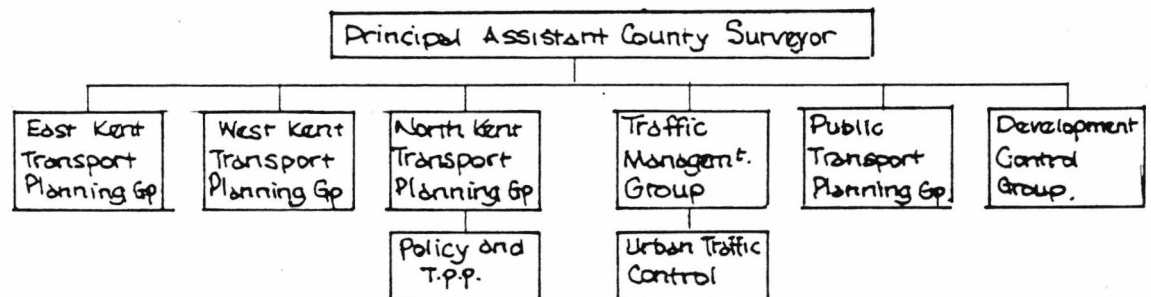


FIG 5.13 TRANSPORTATION BRANCH

dominate on the highway side and one layer of the management hierarchy had been abolished, to broaden the branch head's span of control with his staff. The support services group had been strengthened to meet the increasing needs of coordination and programme control resulting from the extended periods of preparation for schemes due to lengthening statutory processes. The geographical division of highway design teams included liaison with the corresponding district authority preparing improvement schemes under agency agreement. This was a task which it was envisaged the Area Surveyors should carry out when they were first appointed in 1974, but which had increasingly devolved to the specialist branches over the intervening years. In addition the branch had begun to design major highway reconstruction schemes, acting as "engineer" to the Direct Works branch.

Just as project management had been strengthened on the highway design side of the branch, so bridge management and maintenance had been strengthened under the bridge engineer. An increasing need to safeguard the structural assets of the highway system against the growing volume and weight of commercial vehicles had necessitated stronger inspections, monitoring and maintenance management sections, responsible for bridges in east and west Kent. Following the Direct Labour Organisation legislation in 1980 those sections worked in a clearly defined client-engineer role vis-a-vis the direct labour bridge section.

This role differentiation was not as clear cut in the Direct Labour branch (Fig. 5.12). The number of areas had been reduced from 4 to 3 over the intervening years to balance and strengthen the responsibilities of the Area Surveyors. They, however, now concentrated on maintenance activities, allocating, coordinating, and controlling the works of County, Divisions and Districts in this

respect. Improvement and traffic management work was handled by the relevant specialised branches. The Direct Works headquarters group had been strengthened to improve overall management, policy making, and support, and a motorway and trunk road major maintenance group had been established to carry out a programme of reconstruction on these roads on behalf of the Department of Transport. This work had become necessary as a result of the accelerating deterioration of several sections of the trunk road network in the County under the loads of the growing volume of heavy traffic.

Some consideration had been given to separating-out the direct labour activities in 1980 in the light of the provisions of the Local Government Planning and Land Act. These imposed tendering and accounting practices on D.L.O.s akin to those of private contractors. However, at the time it was feared that a reduced service and unnecessary duplication would result and only a limited separation of function took place, with divisional surveyors and many of their staff retaining "two hats" as both engineer and contractor. It was recognised that this could cause a conflict of objectives for the individuals concerned.

The Transportation branch had also developed a larger management, coordinating and policy making section by the end of the decade (Fig. 5.13). This was contained within the strongest of the three geographically organised Transport Planning Groups, each covering a range of traffic management and planning activities in addition to the original traffic planning and modelling tasks carried out by the two groups responsible for this work in 1974. In particular the section had responsibility for the assessment of scheme priorities, preparation of the annual TPP submission and associated data collection on budgets and programmes. The three planning groups sought involvement in

policies and layouts of improvement schemes carried out by the Design and Construction branch and major maintenance schemes prepared by the Direct Works Branch. The result was a blurring of accountabilities for the work which was causing friction, and emphasising a "roads-traffic" dichotomy.

The traffic management group had expanded its activities between 1973 and 1983 owing to the introduction of sophisticated, centrally managed traffic control systems in certain urban areas in the County. This work owed much to the development of equipment and computer techniques for handling control systems, and marked a major extension of the original traffic signal and control section's activities. The public transport coordinating role had also developed against an increasingly difficult background for commercial public transport operations. The development control activities were unchanged, though within the branch the transport planning groups were increasingly involved in major development proposals.

The Road Construction Sub-Unit had by now been wound up. From a peak staff of 200, less than 40 remained by 1983. When they transferred to direct County management in 1981 they had brought with them from the RCU era one major scheme: the M.25 Swanley-Sevenoaks link. This £40m plus scheme had remained with the County Council when elsewhere in the country the majority of major motorway schemes had been transferred to consulting engineers. It was felt by the Department of Transport that the scheme was far too advanced to make a change practicable. Although nominally under Design and Construction branch management they operated very much as a separate unit, with the Deputy County Surveyor taking a particular interest in their activities.

The Highways Laboratory was now known as the Materials branch to stress its wider involvement in the planning and implementation of work rather than the pure testing role that its laboratory title would have tended to suggest. There remained three main groups (materials testing, geotechnical investigations and Marshall surveys) but the work of the Marshall survey group, which was also responsible for computer work, had expanded considerably in the meantime. In providing information and advice on the structural integrity and surface condition of the trunk and county road network they had theoretically become an essential element of the highway management process. However, in practice, it was proving difficult to integrate their activities into highway maintenance policy-making and financial allocation decisions and some tension resulted.

In the decade following reorganisation, therefore, one branch disappeared, one divided into two, but the remainder remained little changed structurally. There was, however, a change in the relative responsibilities, activities, and influence of branches, partly as a result of regulations and partly as a result of the activities of individual members. Similar changes were occurring in District Councils.

5.7. CHANGE IN DISTRICT COUNCIL TECHNICAL DEPARTMENT STRUCTURES 1973-1983

District Councils' technical departments are staffed by generalists. They were formed by amalgamations of technical staff from smaller authorities which existed prior to 1973. At that time there were in the County 19 municipal boroughs, 10 urban districts, 18 rural districts and 1 county borough - a total of 48 authorities (14). The boroughs, many of them old established, had been granted charters by the crown, giving them special privileges, and the right to call

their chief burgess a mayor. Urban districts and rural districts had developed from the authorities responsible in the 19th century for the administration of poor law relief (the Boards of Guardians established in 1834) and the protection of public health (the Boards of Health established under the Public Health Act 1848). Under the Public Health Acts of 1872 and 1875 sanitary authorities were set up everywhere. Parishes with a population of more than 5,000 became urban sanitary authorities (later known simply as urban districts), and smaller parishes were grouped together, following the same boundaries as the poor law unions, but excluding the urban districts. The Boards of Guardians became the authorities for the rural sanitary districts, or rural districts as they were later called. By the middle of the 19th century many turnpike trusts were failing to cope because of the spread of railways and Local Highway Boards were established to keep the roads in repair. These boards had virtually the same membership and territories as the rural and urban district councils.

Thus at the beginning of the 20th century all urban and rural authorities in Kent had responsibilities for sewerage, highways and refuse collection, while between the wars an increasing work load of council housing was added. As has been mentioned, rural district councils lost their involvement in highways in 1948.

Before reorganisation in 1974 a survey was carried out in Kent of all urban authorities in the county to determine how many of their staff could be considered to be employed on highway activities (14). 31 authorities had some involvement and the full time equivalent of 148 engineers and technicians were recorded as being engaged in highway activities. Reviewing the likely work load for the new districts in the light of the agency arrangements which were then being formulated it was considered by those carrying out the survey that 157 staff would

be required in the 14 new districts to carry out these tasks in future.

At reorganisation, therefore, there was no redundancy among those engaged in highway work in the urban authorities. A number of senior officers took early retirement, however, and this added to the degree of adjustment required to new organisations, colleagues, and working surroundings among remaining staff. The majority of the new districts followed the advice of the study group on Local Authority Management Structures published in 1972, (the Bains report), and established Technical Services Departments to carry out the traditional "Borough Surveyor" tasks remaining with the districts. Following a recent written enquiry by the author, details were received from 13 districts in the County showing the organisation which was created for this purpose in 1974 and that which exists today. Details are summarised in Fig. 5.14. (p.206). It will be seen that 11 out of the 13 districts had "technical services" in the title of the department in 1974, though only 7 had both words in the title of the chief officer. Since then this had reduced to 5 with a drift back to more traditional titles in the remainder. Thus four now use the title Borough Engineer, or Borough Technical Officer.

The principal difference in organisations established in 1974 was whether architecture was included in the technical services department. This was the case in 9 out of the 13. Since 1974 one Chief Technical Officer has gained control of architecture, and three have lost it - generally to planning. In one case the chief officer of a Technical Services department is now an architect, but that is an exception. Architects are professionally differentiated from their engineering colleagues and chief officer in the technical services department and one might have anticipated that this could be a cause of organisation change in the interim. Generally other changes have related to the

minor functions of the Technical Services department or to change aimed at making the departments more "corporate".

As an example of the first type of change, the technical officer of District 13 wrote in answering this enquiry that between 1974 and 1983 "maintenance and improvement of housing have been transferred to Housing Department. Superintendant of Parks and Assistant were transferred to Recreation and Amenities Department". District 7 replied that "a number of transfers of functions between department was put forward by LAMSAC but the only one the Council decided upon immediately which affected my department was for building and housing maintenance to go over to the Housing Department. The Council also accepted the recommendation from LAMSAC that the Quantity Surveyors should form a section of their own rather than come under the Architects".

As an example of the second, District 10 wrote "it will be clear to you that the difference (between 1974 and 1983) indicates a completely revised approach to the management needs of a department such as mine. The philosophy is one of a more corporate management approach to seek to eliminate isolation of sections and insular decision making which did, to some extent, exist with the more linear staff structure". This change is particularly marked in District 8, which has changed to a multi-function two-section (design and operations) structure rather than the more common five section specialised structure. Similarly District 2 has grouped projects and works into multi-purpose teams.

Recently more significant changes have been planned. Thus District 7 concluded by saying that "on 2nd August the Policy and Resources Committee resolved that the number of departments be reduced,

initially by combining planning and technical services together, followed by housing and environmental health". District 9 advised that "the former (technical services) department was effectively disbanded (in March 1983) following the early retirement of the former Technical Services Officer. The responsibilities now devolved to other departments were briefly, public cleansing to the Chief Environmental Health Officer, parks to the Amenities Officer, Valuer to the Chief Executive and Clerk, and building maintenance to the Housing Officer. In this change many of the architects, building, maintenance and administrative staff were given redundancy or early retirement".

There has, therefore, been considerable realignment of activities in several districts, but the most general pattern remains a basic combination of engineering, architecture work and administration. The engineering sections and the work sections are very dependent upon agency work. The majority of their staff are either engaged on highway work, as agents of the Kent County Council, or sewerage and drainage work as agents of the Southern Water Authority. Both agencies have been under review recently, increasing the uncertainty for district technical staff.

The two sections responsible to the County Council for highway activities in most districts were, in 1974, engineering and works. Engineering generally had a section specialising in highway improvements, while the works section had a role similar to the Direct Works branch in the County Surveyors Department - that is to say it was responsible for both the inspection of highways and assessment of needs and the execution of works to meet those needs. The link to the county was via the Area Surveyor who therefore found himself endeavouring to influence two sections in most of his districts. Moreover, as a result of the multiple functions carried out by

districts, staff specialising in highway work were at relatively junior level - first, second, third and sometimes fourth tier officers in the district hierarchies having multiple functions. Thus the Area Surveyor's link was at a quite low level.

The officers in the district forming the link with the Area Surveyor had a split allegiance. They responded both to the formal organisational link to the County but their first loyalty was to those in authority over them in the district hierarchy. Individual's success in resolving this dual responsibility varied.

Since 1974 the highway management role of the District Works sections has tended to move to the engineering sections, particularly following the 1980 legislation on D.L.O.'s - requiring as it does a clearer differentiation of the "contractor" from the "client" role. Whilst this has simplified the Area Surveyor's task somewhat, it was preceded by a proliferation of technical, rather than authority, links between County and District. These arose as a result of district officers' needs to liaise with county officers from the Transportation and Design and Construction branches on traffic management, transport planning and highway improvement matters. Many activities undertaken by Districts required specific approval by County Members (for instance, to undertake land acquisition for improvement schemes) and it rapidly became apparent that the Area Surveyor was only fulfilling a "post-box" role in forming the sole District/County link. Also there is no doubt that County specialists resisted having to work through the Area Surveyor, who was looked upon as a pure "maintenance man".

One can visualise the highway authority structure as a letter H. One leg of the H is the County highway hierarchy, the other is the District technical services. The bar of the H is the Area Surveyor-

District link. Above the bar in each case is the senior department hierarchy. Below it are the highway maintenance implementors in County and District. A decision at the link-level has to be acceptable to both the County and District hierarchies above - and therein lies a source of conflict and duplication in the agency arrangements. Subsequently, other H-structures have built up, forming the technical County/District links for highway design and traffic engineering matters.

It should be noted that District staff are primarily implementors. Although they can recommend work required in their districts, the final decisions on activities and financial allocations lie with the County. They therefore have little or no policy-making activities. Nor are they exposed to the technical pressures from other functional specialists experienced by their opposite numbers in County design and maintenance sections. Their technical environment, therefore, is relatively static and their working practices correspondingly entrenched. Some County staff might accuse them of being old-fashioned - they would reply with equal justification (or lack of justification) that County practices are unnecessarily complicated and time consuming.

Set against their stable technical environment has been a reduced work expectancy. The funds available to Districts for highway improvement work in particular has decreased over the decade, and highway design sections have contracted accordingly.

Uncertainty regarding the future level of work is compounded by uncertainty regarding the future of their organisations. It was indicated above that several Districts had undergone quite major changes over the years, the majority of which arose from District Members' wishes for regroupings to be carried out to "improve

efficiency". Reference to Figure 5.14 will reveal that no consensus has emerged on the one best way to group activities and there can be no doubt that some of the changes reflect relative performance by chief officers within an authority, whilst others reflect changing priorities of members and work loads. This aspect of change underlines the need to consider elected Members as integral parts of County and District organisations.

5.8. THE CHANGING ROLE OF ELECTED MEMBERS

When discussing the political environment for local authority professionals in the previous chapter, no mention was made of local elected Members. On the contrary, the discussion was restricted to changes initiated by central government through legislation, or by directive. One could have included consideration of the more local political environment for officers made up of County and District Members, and in particular of their committees. To have done so would have been to assume a clear cut division between Members and Officers which does not exist in practice. Over the past decade there has been an increasing involvement by Members in the management of departments which has blurred the traditional division between the politicians and the administrators. One might say that management has become a policy issue.

Hill (1972) endeavoured to define the boundary line between the two in seeking "to understand problems of democratic control of administration and the characteristics of administrative behaviour". He refers to the systems view that politics is the boundary spanning role between an organisation and its environment. This is too abstract however and ignores the close involvement of members of local government organisations at all levels with "customers". Simon (1957)

District	Department Title	1974		1983	
		Chief Officer	Sections	Chief Officer	Sections
1.	Technical Services	Chief Tech. Services Officer	Engineering Architecture Bldg. Works Public Works Administration	Borough Eng. and Surveyor	Engineering Architecture Bldg. Management Works Administration
2.	Borough Technical Officers	Borough Technical Officer	Tech. Services Architecture Bldg. Surveying Parks Administration	Unchanged	Projects Works and Services Administration
3.	Directorate of Technical Services (1974). Technical Services (1983)	Director of Technical Services	Engineering Works Administration	Technical Services Manager	Engineering Architecture Bldg. Surveying Planning Administration
4.	Department of Engineering	Borough Engineer	Engineering Works Administration	Unchanged	Engineering Bldg. Surveying D.L.O. (Works) Administration
5.	Technical Services	Chief Technical Services Officer	Engineering Bldg. Surveying Valuation Works Administration	Borough Engineer	Engineering (Inc. Works) Bldg. Surveying Valuation Administration
6.					
7.	Technical Services	Director of Technical Services	Engineering Architecture Bldg. Surveying Works Administration	Unchanged	Engineering Architecture Bldg. Surveying Q.S. Works Administration
8.	Technical	Technical Director	Engineering Architecture * Work Administration	Unchanged	Design (Inc. Administration) Operations (Inc. Works)

District	Department Title	1974		1983	
		Chief Officer	Sections	Chief Officer	Sections
9.	Technical Services (1974). Chief Engineers (1983).	Technical Services Officer	Engineering (Inc. Works) Architecture Valuation Parks	Chief Engineer	Highways Sewers Bldg. Surveying D.L.O. (Works) Administration
10.	Technical Services	Chief Engineer	Development * Works Administration	Technical Services Director	Development * Works Building and Estates
11.	Technical Services	Technical Officer	Engineering Architecture Works Administration	Unchanged	Engineering Architecture * Works Administration
12.	Technical Services	Director of Technical Services	Engineering Architecture Works Administration	Unchanged	Engineering Architecture Q.S. Works Administration
13.	Technical Services	Chief Technical Officer	Engineering Architecture Works and Estates Bldg. Surveying Parks Administration	Borough Technical Officer	Engineering Works Architecture Bldg. Surveying Administration
14.	Technical (and Planning) Services	Controller of Technical & Planning Services	Engineering Architecture Works Bldg. Surveying Administration	Unchanged	Engineering Architecture Works Administration

* Includes Building Surveying.

FIG 5-14 DISTRICT TECHNICAL SERVICES ORGANISATIONS 1974-1983

separated value decisions from factual decisions and one might allocate value judgements to the politicians and factual decisions to administrators. But what if the facts are controversial? Hill seems to conclude that a pragmatic division of roles must be made between the politicians and the administrators depending on circumstances and the contribution each can make to the matter in hand, though he is less specific regarding the division of roles in his later writing (Hill 1983 p.209 et seq). Thus the concern of the Committee on the Management of Local Government (1967) that Members should concentrate on policy rather than become smothered in administrative matters is unlikely to be realised.

Dearlove (1979) referred to the "traditional orthodoxy" of the electoral chain of command theory whereby "policy demands flow from electors to councillors (through the agency of regular elections) and then on from councillors to officers (through a key convention of representative government, which assigns officials to the role of passive administration). Responsibility or accountability flows back down the line. The result is that votes inserted at one end become popular public policies at the other" (p.30). In contrast he goes on to suggest that "nowadays it is seen as a mark of hard, realistic and relevant scholarship to retreat into a critical cynicism asserting that councillors are mere rubber stamps, and that all power lies with the officers" (p.53). Clearly the truth lies between the two extreme views, but what is certain is that the Member-officer relationship is an interactive one, making Members part of the overall organisation concerned with highway activities, though with a point of articulation between what Parsons (1964) defined as their "institutional" level of the hierarchy and the officers "managerial" level.

There are three types of contact across this point of articulation. First, there are routine contacts between senior officers and any Member of council having a query on a highway matter of concern to his constituents. Second, there is the more specific contact between those officers and Members of Committees responsible for highway matters. And thirdly, there is the personal involvement of chief officers with the Chairmen of those committees. The first contact is relatively remote, the second is interactive and the third is interdependent.

Following the Bains report, most District Councils established Development Services Committees (p.118 of the report) to be responsible for the majority of the tasks carried out by Technical Services departments. The County Council established a Planning and Transportation Committee (p.101 of the report) to which both the Planning department and the Highways and Transportation department reported. This committee made decisions on strategic policy matters (in particular the Structure Plan occupied much of its attentions in the early years) whilst a Powers Sub-Committee looked after planning control matters and a Works and Projects Sub-Committee was responsible for detailed approval of highway, traffic, waste disposal and development matters.

The increasing involvement of Members in the day-to-day administration of highway matters over the next 10 years (particularly after a speech by the Secretary of State for the Environment, Mr Heseltine (16) in 1979) was widely reported by interviewees. It appears to have resulted first from the emergence of a new type of Member, and secondly from national political policy. It had, in fact, been an objective of the reorganisation of local government to raise councillor calibre. Dame Evelyn Sharp, Permanent Secretary to the

Ministry of Housing and Local Government told the 1960 Annual Conference of the Association of Municipal Corporations:- "I do not think that enough really able people are interested today in taking part in local government. I do not think enough people from business, from industry, from agriculture and the professions are going into it". Subsequent reports by the Committee on the Management of Local Government (1967) reflect that concern. The character of elected County members in Kent has certainly changed since. Partly this arose from the abolition of Aldermen in 1974, removing a group of "elder statesmen" having respect for traditional member-officer relationships. In addition the number of those holding senior committee positions having a business background increased. In 1974 the six positions of Chairman or Vice-Chairman of the three committees or sub-committees involved with highway activity were shared by five Members, three of whom were farmers, one was a retired naval officer, and one was a consultant. Today there are four committees or sub-committees concerned with highway activities and the eight chairman or vice-chairman appointments are held by seven Members, of whom two are accountants, one is an industrialist, one is a retired general manager of a harbour board, one is a doctor, one is a postmaster and only one is a farmer.

Inevitably the emphasis of committees has changed in the interim. In 1974 the object was felt by staff to be one of service. Today the emphasis is on running county affairs as an efficient business. Also, whilst professional engineers' views on technical matters are still accepted and respected, their opinion on economic matters is treated with considerably greater reserve. In addition there has clearly been a conscious decision to take a greater part in the actual running of departmental affairs - in the interests of overall efficiency. This

tendency had its beginnings in the monitoring and review activities of the Performance Review Sub-Committee set up in 1974 in accordance with the recommendations of the report on management and structure in the new local authorities . The Bains report states "We believe that some form of independent review process should be considered. What we have in mind is a body of Members within each authority rather like the Public Accounts Committee. We believe that a watchdog body of this sort, with the standing and formal authority to make detailed investigations into any project, department, or area of activity, would provide an extremely useful service to management" (p. 25).

In 1978 a team of Members from the Performance Review group, generally also having membership of the Planning and Transportation Committee, carried out an investigation into the direct labour activities of the Highways and Transportation Department. In its report (17) the team made a number of recommendations for improving resource allocation, programming, and control. In addition they recommended "a reappraisal by the Planning and Transportation Committee of the need for a Finance Sub-Committee" to monitor expenditure and performance. Thus an additional sub-committee was established with a specific duty to review the department's performance. Inevitably this involved its members in closer involvement with the department's day to day activities.

The changing role of elected members is well summarised by Stewart in a recent discussion paper:

"Economic pressures, the ending of the certainty of expenditure growth and growing disillusion with previously accepted professional solutions led to a new assertive style in local politics (This) more assertive style (is) associated in part

with younger councillors committed to clearer policy aims and determined to secure firm control over the working of the organisation There is a demand for managerial information for chairmen. There is a demand for contact with and access to officers at lower levels in the hierarchy Chairmen (in rightwing authorities) see themselves as the managers of the department, imposing their control upon chief officers in the name of greater efficiency and a reduction in local government expenditure" (Stewart 1983, pp. 2 - 3, parenthesis added).

Many of the regroupings in recent years in District offices stemmed from Member initiatives and in the County Council the more "assertive style" found expression in the appointment of management consultants in late 1981 to review the organisation of the Highways and Transportation Department, and its relationships with Districts. The results of this investigation are only coming to fruition at the time of writing and are therefore too recent for inclusion in this study. However, they mark the culmination of a marked change in Member involvement during the second half of the last decade. (For a general summary of the outcome see Odling, 1984).

5.9. ORGANISATIONAL CHANGE AND THE INFLUENCE OF THE ENVIRONMENT

In this chapter, changes in the structure and activities within County and District authorities during the past decade have been examined. Whilst there have been some significant structural changes, the most general change has been in relationships: changing relationships between specialist groups, changing relationships between County and District, and changing relationships between councillors and their professional officers. Partly these have been generated by central government's initiatives; partly they have grown out of organisation members' perceptions of environmental changes.

5.9.1. Change due to Government Intervention

We saw in the last chapter that central government has changed the highway authority's action space along the authority dimension through legislation and directive, along the technical dimension through technical memoranda and fiscal constraints, and along the social dimension by the regulation of participation. The authority boundary of the county's highway action space is set by its discretion and power to carry out its highway and transportation responsibilities. The 1972 Local Government Act extended this boundary at the expense of the district councils. The impact was first felt by the groups of councillors of the new shadow authorities and their chief officers debating the new agency arrangements, and determining relevant structures and processes. District officers had to cope with new organisations, responsibilities, colleagues, and councillors, and subsequently had to adjust to their new dependent role vis-a-vis the county council as highway authority. In the county highways department change was less dramatic. The waste disposal branch, the public transport coordination group (in the transportation branch), and the new area organisation (in the direct works branch) were established, but the remainder of the department continued much as before. Roles in the new organisations and groups were, at first, formalised - in terms of the new job descriptions of the post holders. So too were relationships - one of the first tasks was to draw up new procedures for the allocation of work to the districts, and its subsequent coordination and control.

The first outcome, therefore, of the adjustment to the authority boundaries of county and district action spaces arising from the 1972 Act, was the creation of new authority networks. These established formal relationships, procedures, and responsibilities. To carry out

their new tasks, however, the individuals occupying the nodes in these new networks had to begin to build up new technical and social networks to provide them with the information, resources and support required to carry out their appointed tasks. This "reticulist" activity (to use the phraseology of Friend et al 1974) in the technical and social network could eventually bring about a modification to the authority network to recognise a shift in authority. (We have seen how the transportation and design and construction branches established a direct authority link with districts between 1974 and 1982 following the early establishment of technical and social links).

The Rayner report of 1980 and the Minister's subsequent decision to wind up the Road Construction Units brought a radical change in the county's authority (as an agent) over trunk roads and motorways. More specifically it led to the breaking up of a large segment of the authority and technical networks. Changes at the nodes were not restricted to those who left the organisation. Those remaining in the organisation who previously had strong links to motorway activities had to readjust to changed expectancies and opportunities. There are indications that a cause of the strong thrust at this time of the Highway Laboratory into maintenance needs assessment work was the loss of major motorway soils investigations when the R.C.U.'s were disbanded. Individual officers found themselves working in a completely new technical environment, while others had to adjust to a more junior role. Therefore a government decision which cut off a segment of the authority network resulted in those at the new boundary carrying out reticulist activity in the technical and social networks.

The 1980 Local Government Planning and Land Act did not result in an immediate change in organisation, but did necessitate a clearer differentiation of roles and objectives. Those in works units found

themselves with twin objectives: providing a service and operating profitably. Many found the two objectives incompatible, and a strain towards either the "client" or the "contractor" role became apparent, culminating in the formation of separate D.L.O. branches or units in the county and majority of districts. New regulations transmitted through the authority network therefore brought about different orientations to economic (profit) and social (service) objectives. This change was eventually translated into a new authority network, with greater differentiation in the social and techno/economic networks.

The major technical/economic initiatives by the Department of Transport referred to in this chapter were the 1970 Marshall report, and the new TPP system established following the 1974 Local Government Act. The first reflected technical pressure for a more objective means of establishing highway maintenance priorities and needs, and the second reflected economic pressure for a more corporate and strategic view of transportation programmes within the authority. In both cases the result was to change the technical network by bringing a new group into the decision making process for particular highway activities.

The objective assessment of highway needs recommended by the Marshall report was allocated to staff at the Highways Laboratory by senior management. This was a new activity for Laboratory members and, as the systems developed, and the needs for major highway maintenance investment became more imperative, they sought a role in decision making on priorities, needs, standards, methods and programmes which had hitherto been the sole preserve of Direct Works branch, and through them, of the Districts. They brought to the task different values and methods - a more academic, analytical approach, lacking the pragmatism of the traditional maintenance engineers. Over time, this extension to

the technical boundary of the action space of the Laboratory had an impact on the action space of maintenance staff with consequential adjustments in the technical and authority network.

The preparation of the annual Transport Policy and Programme submission was allocated to the Transportation branch. Whilst they had previously been involved in policy, they had had no involvement in programmes - nor, for that matter, in priorities. These matters had been the preserve of the Design and Construction branch. Since the TPP document' is intended to be a corporate plan as well as a bid document, the Transportation branch inevitably sought a role in corporate decision making on improvement and eventually maintenance matters. This was formalised by departmental decision, first that the Transportation branch should assess priorities (since they held the data for these calculations) and then that they should vet all plans going to committee, because of their experience in accident investigations. The two factors, combined with the increased influence over programmes given by the TPP responsibilities, gave the Transportation branch more influence within the department and with agent authorities which eventually made structural change necessary.

Again, an expansion of the technical boundary of the action space of one branch had a constraining effect on others which eventually found formal recognition in the authority structure and processes.

Government directives designed to ensure that members of the public had a greater degree of participation in highway decision making changed both the social and the authority boundaries of the highway organisation's action space. The social network was enlarged by the direct interaction with private individuals which resulted. In addition a measure of discretion was surrendered by the highway authority, and

one could therefore envisage participants from the public becoming members of the authority network. Indeed their involvement brought about some changes in the technical network - with noise and graphic experts brought into the participation process. Whilst the goal of central government may be taken to have been social, the impact was on a multiplicity of networks and associated action spaces. The same tendency may be observed in changes resulting from internal pressure in the organisation.

5.9.2. Change due to Intervention from within the Highway Authority

In addition to changes in the authority network due to Government intervention there has been structural change due to internal pressures. From a technical aspect, the growth in computer use by engineers, and their "desire for optimisation" has led to stronger support activities in all branches of the county department, and a corresponding decrease in the influence of the management services branch in these matters. This tendency was enhanced by a proliferation of smaller, stand-alone computers, and consequently less reliance on the central main frame equipment. These gradual changes within branches arose from the activities of individual engineers rather than from positive decisions by senior management. Specialists in particular activities achieved greater influence by providing valued technical assistance to others. Eventually their advisory role became recognised and formalised within the authority and technical structure. New equipment was introduced in reaction to pressure from experts within branches for the adoption of more efficient and sophisticated methods referred to on courses or identified in the technical press. New design techniques were introduced as a result of similar pressures, making senior and line management increasingly dependent on specialist advice within their own, or associated branches.

The result has been a widening technical network for individual engineers. Whilst engineering decisions were originally made within sections, a range of clearances are now required from other groups in the department (or in the case of district staff, from outside their authority) before decisions, sometimes of a quite routine nature, are taken. These internal pressures for influence in the technical network have complemented the increasing influence of specialists arising from the Department of Transport technical initiatives referred to above. Increasing technical dependence has led to a blurring of authority and accountability, which has created uncertainty in the authority network. During the period under investigation this had not resulted in major structural change within the County Council, though it was a contributory factor in elected Members' decision to initiate a major reorganisation in the department at the close of that period.

This was the most significant event stemming from internal political pressure, but the expanding influence of elected Members in the authority network during the period of study has also been referred to. In some district authorities this has found expression in major regroupings of activities, reductions in the number of chief officers and strong pressure for economies and greater "value for money". In the County Council the involvement of the Performance Review Group in bringing about change in the authority structure has been referred to, but a more general involvement by Members in the running of the department (particularly by committee chairmen) must be regarded as a significant readjustment in the authority network. Whilst the break in the network between members and officers was in the past clear cut, it is now more diffuse, and occurs at different locations in the network for different decisions.

Internal pressure for change in the technical and authority networks does not appear to be matched by a corresponding desire for change in the social network. A wider range of contacts with environmental pressure groups and concerned individuals has to some extent put the professional engineer on the defensive. As the funds available for roadworks has decreased, the volume of complaint from the public has increased - complaints directed at the efficiency of the service provided rather than the level of finance available. This form of pressure also tends to build up a defensive response. The social network has therefore widened and become more active. The desire of members of this network outside the boundary of the formal organisation to achieve some influence over decision making within the organisation implies that there has been an associated impact on the authority network.

Increasingly, therefore, engineers' action spaces have become constrained by changing authority, technical and social pressures originating from within the organisation or its immediate environment, adding to the constraints imposed by Government initiatives.

5.10. CONCLUSION

In the last chapter we saw how changes in the external environment affected the highway authority's action space. In this chapter we have considered how the formal authority structures in County and District departments have developed over the last decade in reaction to those environmental changes, and identified associated changes in the technical and social networks. We have also considered changes in these multiple networks initiated by pressure from organisation members reacting personally to those same environmental influences.

It has been of assistance to refer to a total organisational action space made up of the organisationally relevant action of individual members. Techno/economic, social, and authority dimensions have been identified for this action space, corresponding to those objectives of the organisation which are accepted as legitimate by its environment. It has also been of value for analytical purposes to differentiate between the technical, social and authority networks of organisation members. Networks and action spaces must be interdependent, because networks are groups of individuals in purposive and interdependent action. Their action - whether as a means or as an end - is perceived as relevant to the achievement of multiple organisation objectives. In this sense the members of the chain of command can produce a chain of means-ends activity, and the network of interdependencies is a means of integrating individual (organisation-relevant) action into a portfolio of activities within the total organisation action space.

A significant consideration has been the extent to which individuals have translated changing influence transmitted to them through one network into reticulist activity in another. Partly this activity consisted of link-building, but also we have seen that it could consist of influence-expansion in existing links. This form of activity was also seen to be instigated by changing influences or perceptions received direct from the external environments. Clearly this reticulist activity in multiple networks is a notable reaction by individuals to change. Whether the individual's objectives are to maintain status, or security, or satisfaction it is too early to say, but the fact of this reaction is inescapable. In the next chapter the personal reactions of engineers employed in County and District offices will be examined to see whether a cognitive basis for their reticulist activities can be found.

Notes to Chapter 5

1. "Kent Structure Plan " - written statement. Kent County Council 1977.
2. Annual Report 1974-75. County Surveyor, Kent County Council, July 1975.
3. County Surveyor's Report to Planning and Transportation Committee, KCC, 12th September 1973.
4. Kent County Council: Transport Policies and Programmes Submission for 1979-1980, July 1978.
5. J.A. Bergg, "Organisation, coordination and control in a county highways department". Unpublished M.A. dissertation, University of Kent at Canterbury, October 1978.
6. Kent County Council: Transport Policies and Programmes Submission for 1984-1985, July 1983.
7. "Report of the Committee of Highway Maintenance", HMSO 1970.
8. Surface dressing consists of spraying the carriageway with bitumen and spreading and rolling-in stone chippings. It is used to improve the skidding resistance and to seal fine surface cracks.
9. "Kent Rural Main Roads" Report of an Inquiry. D Joscelyne 1903.
10. Delegation was under Section 35 of the Local Government Act 1929.
11. H.T. Chapman "Reminiscences of a Highway Surveyor 1886 - 1932" private publication.
12. Summary of establishment prepared by a senior administrative officer, 12.7.73.
13. Kent County Council: Performance Review Group Member Investigation of Direct Labour, June 1978.
14. For a brief summary of the development of local authorities in Kent, see F.W. Jessup "Kent History Illustrated", Kent County Council 1966.
15. A team of three officers (one from County Roads Department, one from County Planning Department, and one from a Borough Surveyor's department) visited the fourteen embryo districts between 29th May and 8th June 1973 to consider staff resources for Highway and Planning function and subsequently reported back to the relevant working parties 8 (planning) and 9 (highways) established by the County Joint Committee.
16. Speech to the Annual Meeting of the Association of County Councils 25th July 1979 Department of Environment Press Notice No. 314.
17. Kent County Council: Performance Review Group; Member Investigation of Direct Labour, June 1978.

CHAPTER 6

INDIVIDUAL RELATIONSHIPS AND PERCEPTIONS IN HIGHWAY ORGANISATIONS

6.1. INTRODUCTION

Chapter 3 developed a three dimensional concept of an individual's needs, goals and action space, and applied these concepts to a network model of organisations. Consideration was given to the action of an individual node of the networks, of one node linked to another node, of multiplex linked nodes in multiple organisational networks, and finally to the influence of the larger environment delineated by multiple inter-organisational networks.

In seeking greater understanding of the actions and reactions of the nodes in the particular network of individuals and organisations responsible for highways in Kent it was apparent that one had to work back from the larger environmental influences to the individual. Accordingly in Chapter 4 we examined changing influences in the highway authority's environment, and noted that the most apparent changes have been those initiated by central government and its administration. Its initiatives had constitutional and legal authority, and were backed up by control of the most significant resource, finance. In addition, however, more general processes of economic, technical and social change were identified as having a more diffuse impact on individuals within organisations, giving rise to pressure for change from within the organisation. It was observed that there was interdependence in the links in the inter-organisational network, and that differing types of change had impact on differing inter- and intra-organisational networks. Accordingly change in the external environment was seen to constrain dimensions of the highway authority's action space to differing extents.

In Chapter 5, detailed consideration was given to the changes which have resulted in the formal authority structure of the County Highways, and District Technical departments. But because these authority structures control and co-ordinate technical activities, and regulate social contact with the authorities' clients (the general public) it was also possible to consider associated changes in the technical and social networks. In particular it was noted that change in one network was translated by individuals occupying nodes into link-building or influence-expansion in another.

Having dealt with environmental changes, and organisational changes, it is now possible to turn to the experiences of individuals, and their perceptions of the changing influences acting upon them via their links to others in the authority, technical, and social network. This phase of the investigation involved two stages. First, the nature, frequency, and content of the links in the network of people engaged in highway activities in the County were analysed from responses to a questionnaire circulated to them. Secondly individual interviews were carried out in an endeavour to obtain an impression of the values, perceptions, and experiences of those who had experienced this period of change.

6.2. LINKS IN THE NETWORK - QUESTIONNAIRE RESPONSES

We saw in Chapter 2 that writers have been concerned with both the morphological and interactional characteristics of networks (see for example Mitchell 1969). Morphological criteria relate to the shape and texture of the network - its size, density and range. Generally the emphasis is on a single individual in the network, to his "reachability" by others, and with social, rather than formal networks. Here we are more concerned with interactional criteria - that is with

the content, direction, frequency, and diversity of the linkages in the network. Boisserain (1974) points out that the links derive from the participants' differing activities, and, in this case, these must be related to inter-dependence in the authority, technical and social dimensions. Clearly a high frequency of interchange in a link does not necessarily equate with a high degree of inter-dependence or power in the link. One may compare irregular, but strong, kinship ties with frequent, but superficial, relationships with acquaintances - or, in the context of this study, an irregular but traumatic visit to the manager's office with the frequent and low-keyed contact with colleagues.

Galaskiewicz (1979) identified certain needs which individuals try to satisfy through interaction, and the resources which they exchange. He anticipated that different patterns of interaction (or networks) would emerge for different functions. Thus he identified the exchange of money for the satisfaction of an individual's adaptive (economic) needs; the exchange of information to satisfy his problem-solving needs; and the exchange of moral support to satisfy his legitimacy (social) needs. He was referring to voluntary, social networks, but clearly similar use is made of links in organisational networks. The difference is that in formal organisations the links help to satisfy both the individual's personal needs (or that portion of them which he is able to satisfy at work) and also organisational needs. The extent to which he satisfies his own needs must influence his job satisfaction. The extent to which he satisfies organisational needs may influence his job satisfaction depending upon the extent to which he identifies with the organisation and its objectives. Therefore in seeking a response from individuals (through the questionnaire) regarding the nature and frequency of their links it was also thought

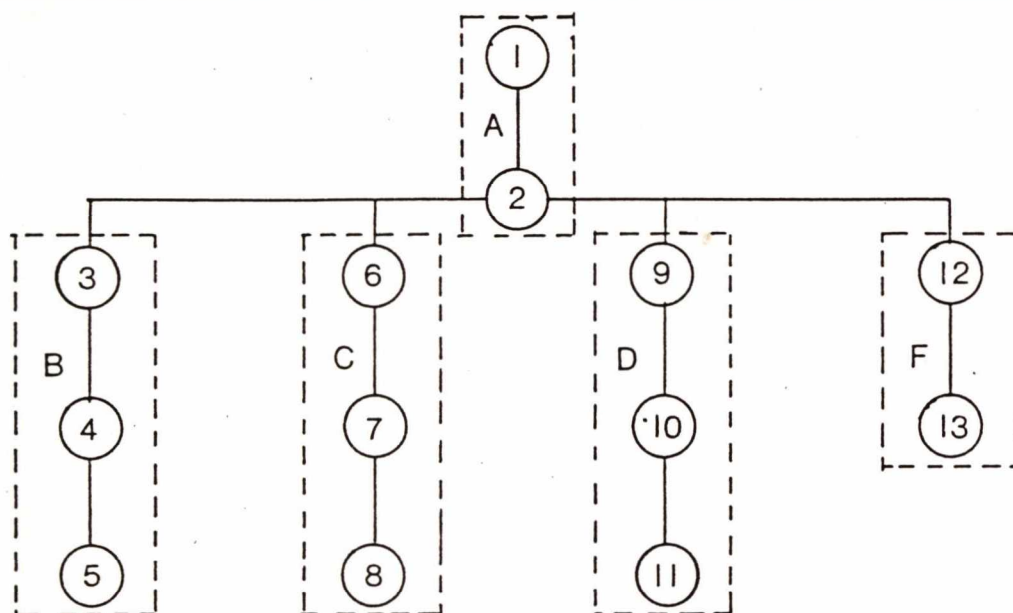
desirable to seek a preliminary indication of their perceptions of job satisfaction.

6.2.1. Questionnaire Analysis (see Figure 6.1 for the organisation position of those referred to in the following sections).

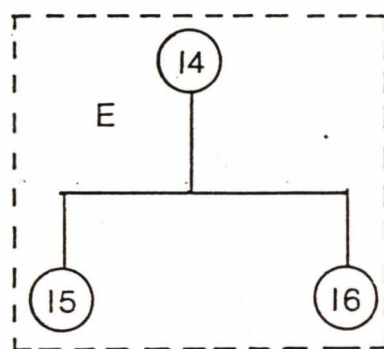
The pro forma adopted for this stage of the investigation is included and described in the Appendix (Figs. A.1, A.2). It sought an indication of the respondents' links to the 21 principal nodes in the inter- and intra- organisation network involved in highway activities, and of the purpose, direction and frequency of those links. 80 questionnaires were distributed and 75 were returned. Results were recorded on 21 x 21 adjacency matrices, with separate sheets for different functions. Those chosen were command (i.e. authority), advice and information (i.e. technical) and social relationships. It will be recalled that the three principal networks operating in an organisation were taken to be for authority, technical and social purposes in Chapter 3. Although advice and information are both transmitted through the technical network it was anticipated that there could be a stronger personal reaction to the first (positive or negative) than to the second (which might be assumed to have a neutral impact on the recipient). In order to show the relationships between groups diagrammatically it was necessary to amalgamate the information into significant blocks to give 11 x 11 matrices. (See Appendix for completed matrices).

To represent the inter-relationships between these 11 nodes diagrammatically they were located round the periphery of an ellipse so that all links could be shown without masking or crossing nodes. One diagram was plotted for each of the four functions (command, advice, information, social), and the frequency of interaction indicated by varying the number of lines marking the link.

FIG 6-1 IDENTIFIERS FOR NETWORK NODES AND GROUPS



KENT HIGHWAYS & TRANSPORTATION DEPARTMENT



DISTRICT TECHNICAL OFFICES



OTHERS

KEY

A: County Chief Officers	1: County Surveyor	14: District Technical Off.
B: Direct Works Branch.	2: Deputy C.S.	15: District Design Staff
C: Design & Construction Branch	3, 6, 9: Branch Heads	16: District Works Staff
D.: Transportation Branch	4, 7, 10: Group Heads & Divisional Surveyors	17: Other County Depts.
E: District Technical Offices	5, 8, 11: Sections & Divisions	18: Department of Transp.
F: Technical Support Branches	12: Highways Lab.	19: Elected Members
	13: Finance Branch	20: General Public
		21: Professional Institutions

The results are shown in Figures 6.2 to 6.5 and further details of their construction are given in the Appendix.

The first point which emerges is the sheer diversity and density of the links. As might be anticipated the command (authority) network is less frequently in use than the advice/information (technical) network. The advice and information networks are very similar. The social network is the least active of all, within the limited interpretation of social contact ("eating together, playing squash, etc.") implied by the questionnaire, and differs from the other networks.

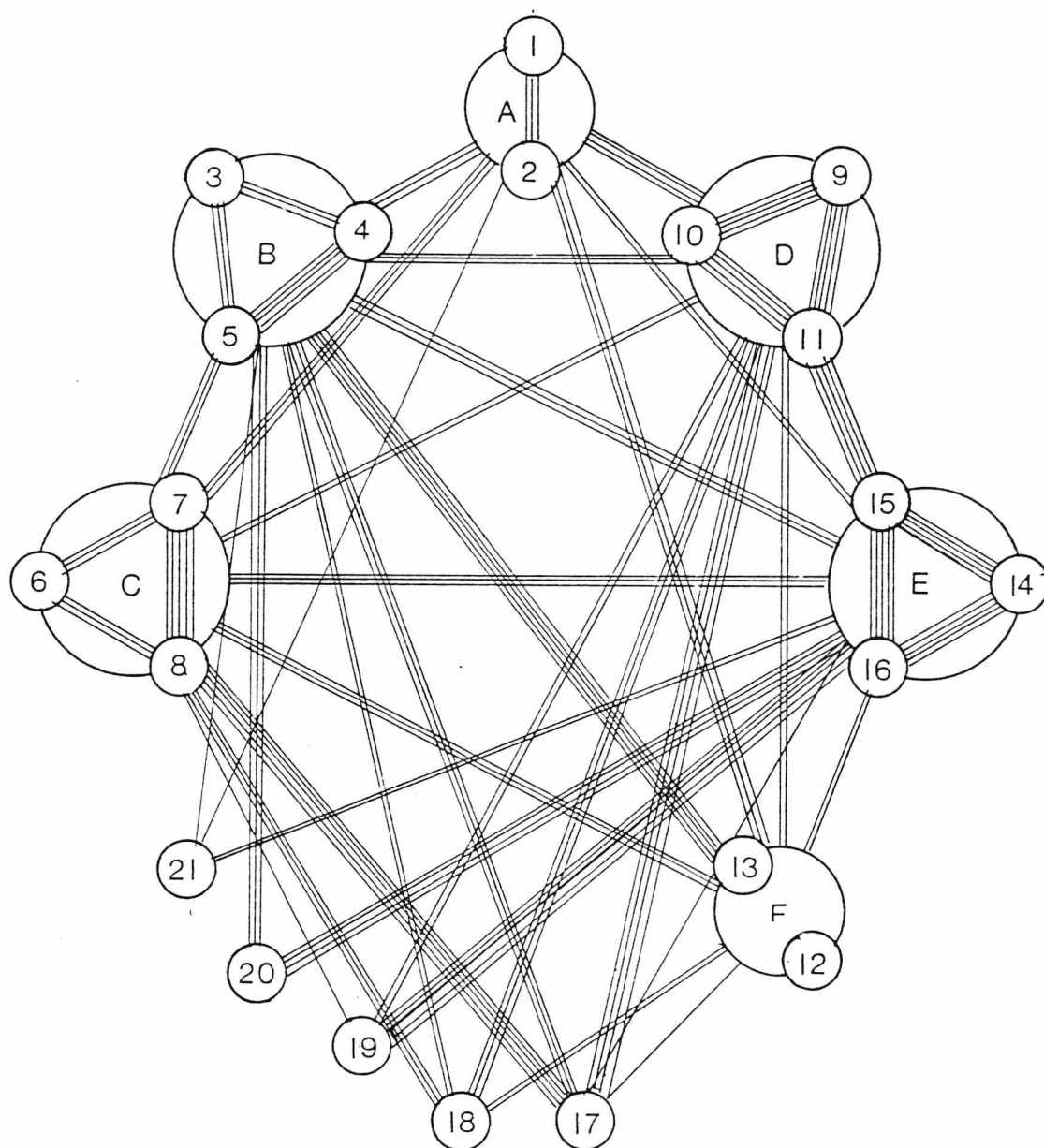
In Chapter 3 it was suggested that one should be able to differentiate clearly between networks conveying different resources or functions. In considering the questionnaire responses we are therefore concerned to discover whether there are significant differences between the networks. It was also suggested that individual's decision making would be strongly influenced by the resources and values of those with whom he interacts. We will therefore also be concerned to identify significant contacts for specific individuals.

6.2.2. Simplified Networks

To explore the underlying shape of the networks, some simplification was necessary. Figures 6.6 and 6.7 show the seven most frequently activated links in the command and information networks. Considering them as simplified authority and technical networks it was evident that there were significant differences between them. Referring first to the simplified Authority network (Fig. 6.6) there is, as might be expected, an emphasis on hierarchical links - particularly if the link from an operational group to a service group is taken as being hierarchical in nature. Thus the links run from

FIG 6-2 COMMUNICATION NETWORK FOR

COMMANDS

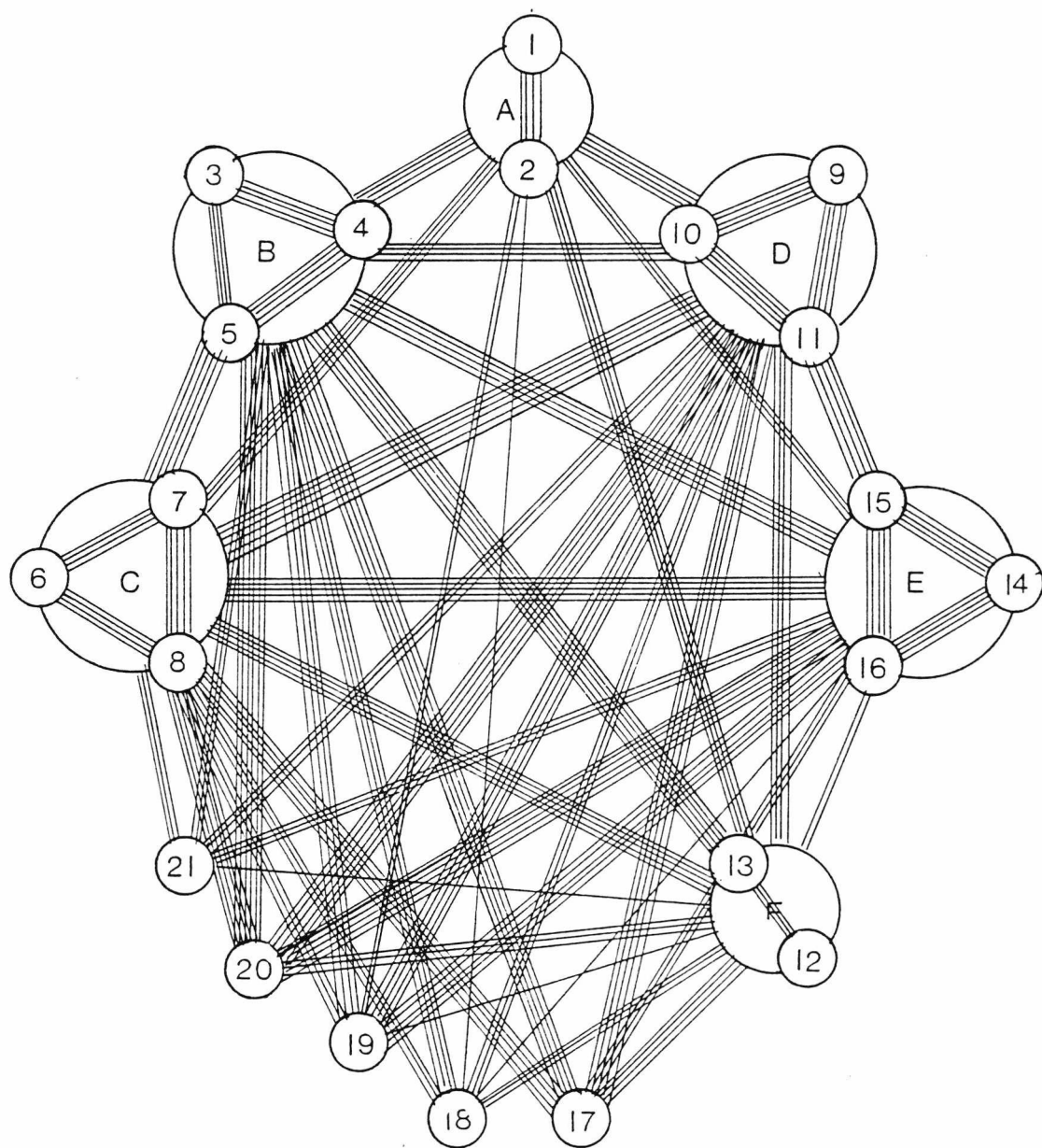


KEY TO FREQUENCIES :-

- $1/\text{yr}$ to $12/\text{yr}$ = Monthly or less frequently.
- ==== $12/\text{yr}$ to $48/\text{yr}$ = Monthly to weekly.
- ===== $48/\text{yr}$ to $240/\text{yr}$ = Weekly to daily.
- ===== $240/\text{yr}$ to $480/\text{yr}$ = Daily to twice daily.
- ===== $480/\text{yr}$ to $1680/\text{yr}$ = Twice daily to hourly.

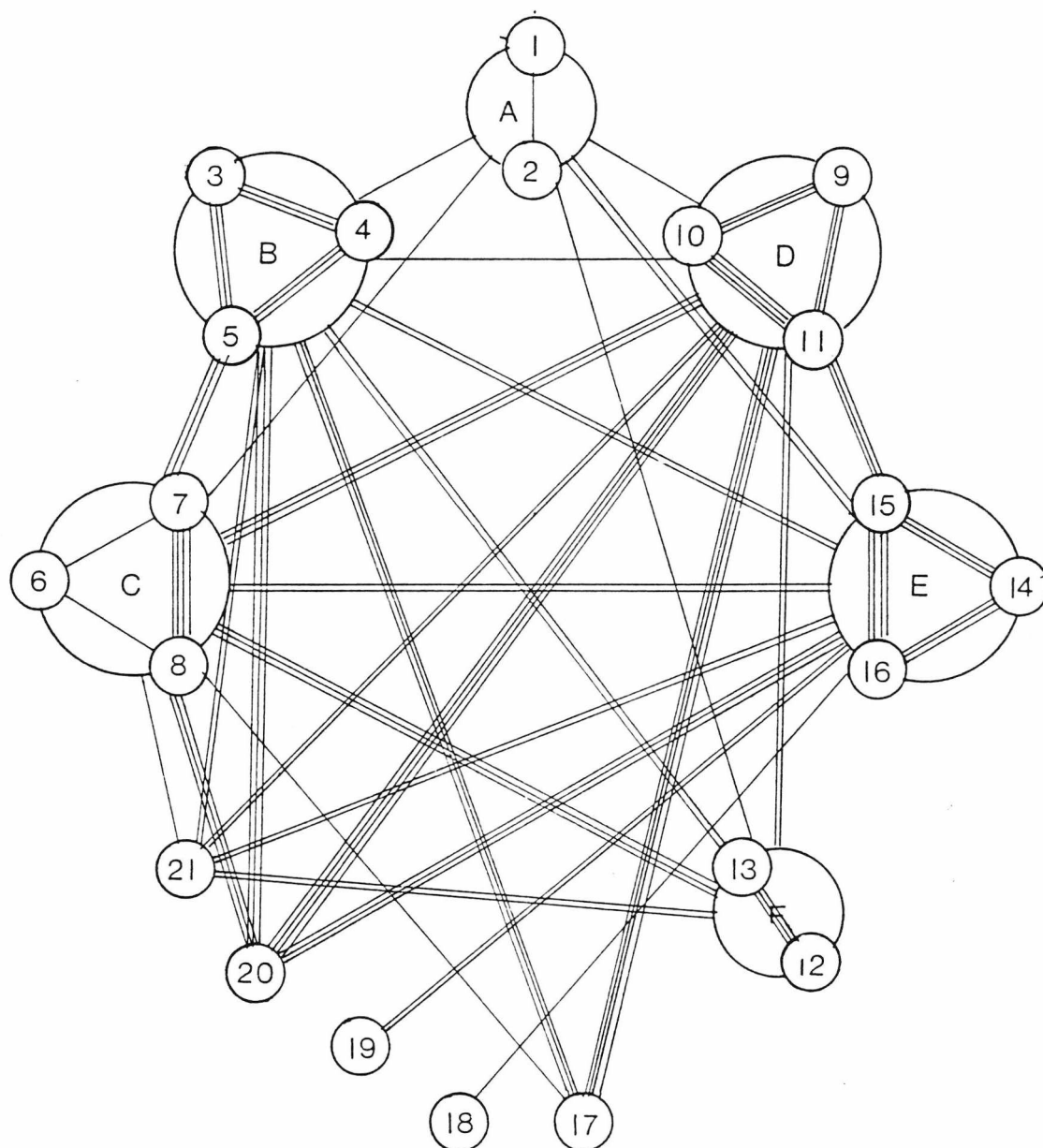
FIG 6-4 COMMUNICATION NETWORK FOR

INFORMATION



KEY TO FREQUENCIES :-	
—	1/yr. to 12/yr. = Monthly or less frequently.
==	12/yr. to 48/yr. = Monthly to weekly.
===	48/yr. to 240/yr. = Weekly to daily.
====	240/yr. to 480/yr. = Daily to twice daily.
=====	480/yr. to 1680/yr. = Twice daily to hourly.

FIG 6-5 COMMUNICATION NETWORK FOR SOCIALISATION



KEY TO FREQUENCIES :-

- $1/\text{yr. to } 12/\text{yr.}$ = Monthly or less frequently.
- == $12/\text{yr. to } 48/\text{yr.}$ = Monthly to weekly.
- === $48/\text{yr. to } 240/\text{yr.}$ = Weekly to daily.
- ==== $240/\text{yr. to } 480/\text{yr.}$ = Daily to twice daily.
- ===== $480/\text{yr. to } 1680/\text{yr.}$ = Twice daily to hourly.

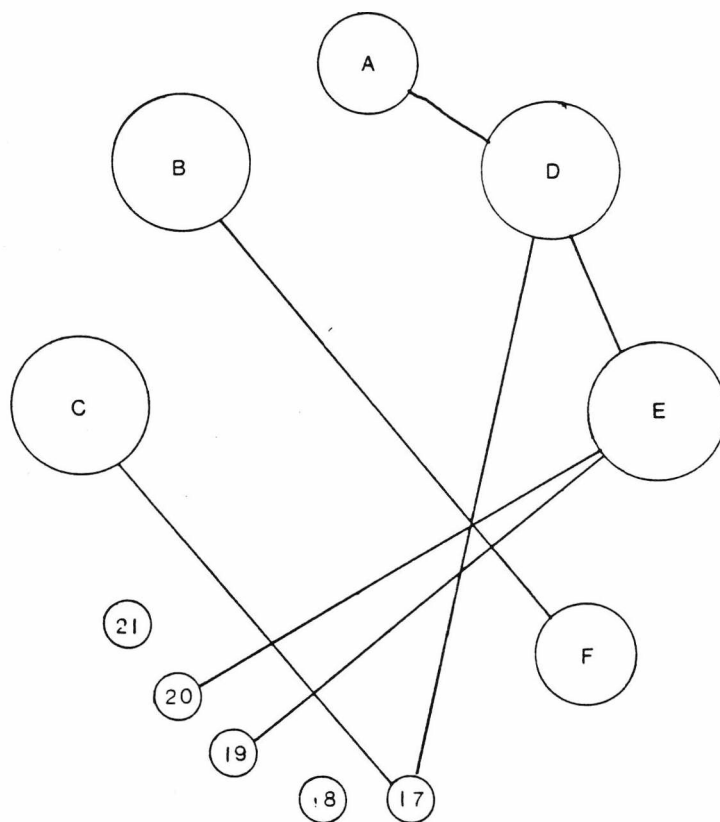


FIG 6-6 PRIMARY AUTHORITY (COMMANDS)
NETWORK - 7 most frequently used links

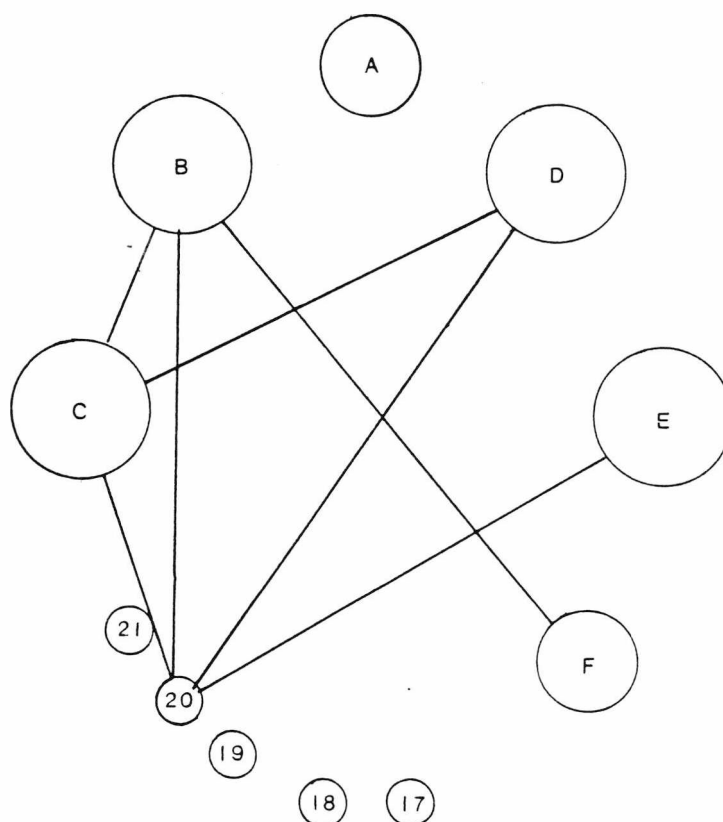


FIG 6-7 PRIMARY TECHNICAL (INFORMATION)
NETWORK - 7 most frequently used links

County Surveyor to the Transportation branch to other County departments (primarily in fact to give directions in planning matters); from the Direct Works branch to the Laboratory for testing services; from the Design and Construction branch to other County departments (for land acquisition services) and from District Members and the general public to District staff. It is rather surprising to note the frequency with which District officers report receiving commands from the public. No doubt this reflects an increased awareness by District staff of pressure from their local residents. Perhaps one should segment the public to take account of their varying interests. The centrality of the Transportation branch role is noticeable, and its frequent relations with senior management might indicate that it had a position of particular influence in the department. The absence of high frequency links between operational branches is noticeable.

Only two of the most frequent authority links are repeated on the simplified technical network (Fig. 6.7). The predominant pattern is of links between operational branches - Direct Works linked to Design and Construction linked to Transportation. The central position of the Design and Construction branch will clearly expose it to differing objectives and priorities. The other rather unexpected feature is the very close links of the three operational branches and the District offices to the public. Thus there are already indications of a more open structure than might have been anticipated, with the technical core units by no means isolated from outside pressures. Clearly there is no shortage of personal contacts for staff and this may in part explain the weakness of the social structure.

Isolating the highest frequency links from the command (authority) and information (technical) network in this way highlights the differences between the two and the possibility of analysing each

independently. This simplistic approach is therefore sufficient to show that the authority, technical and social networks have specific and separate identities. We may therefore proceed to an examination of the significant contacts for typical individuals.

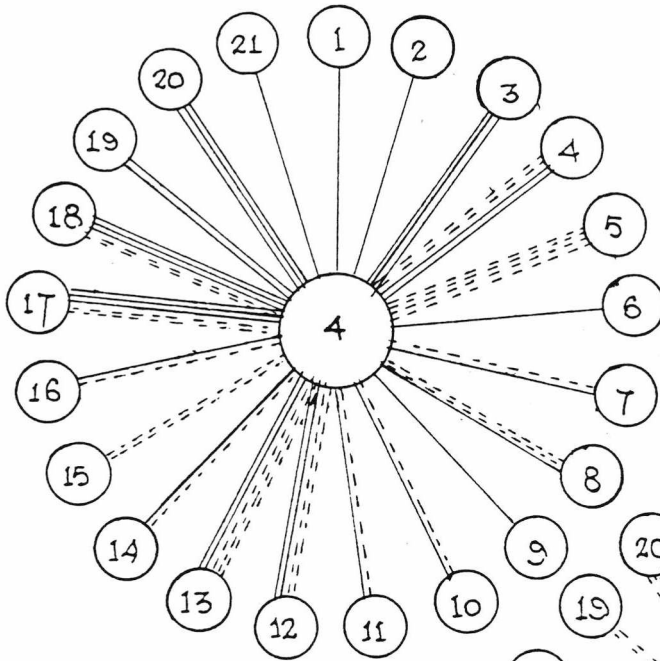
6.2.3. Individual Relationships

The Appendix describes how average responses were calculated for five key individuals. These were identified on the questionnaire by the key numbers 4, 7, 10, 12 and 15 (i.e. fourth tier offices in the Direct Works, Design and Construction, Transportation and Materials branches in the County, and the senior design engineer in District Technical offices). The location of these individuals in the organisational hierarchy is shown in Fig. 6.1. These were selected as being the most senior line managers who were not in the departmental management teams. It was felt that their immediate superiors who are members of the management team would combine their branch objectives with a more corporate view of departmental objectives. At this stage in the investigation, it was felt that a clear identity with one set of objectives, though at a senior and therefore informed level, was preferable.

The average frequencies of interaction between these five typical individuals and the 21 nodes of the network are plotted in Figures 6.8 to 6.12. The nodes are located around the perimeter of a circle with the individual concerned as the central focal person. The results might be entitled, after Barnes (1969), "primary stars" - all the dyadic relationships of which the focal person is a member. If, as Mitchell (1969) suggests, roles are the behaviour to be expected between two people in the light of the content of their link, then the occupants of the 21 nodes are members of the individuals' role sets.

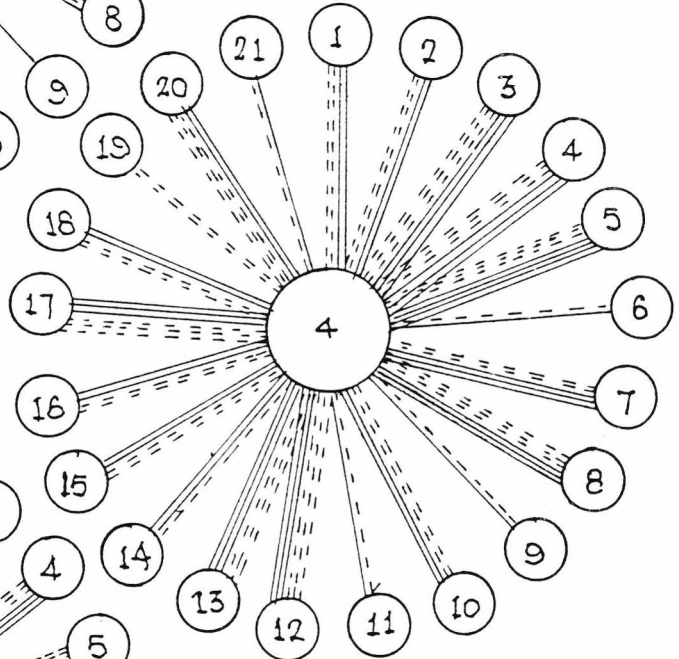
FIG 6-8 COMMUNICATION
WITH 'ROLE SET' OF NODE

4 (Senior Gp. Engineer
Direct Works)



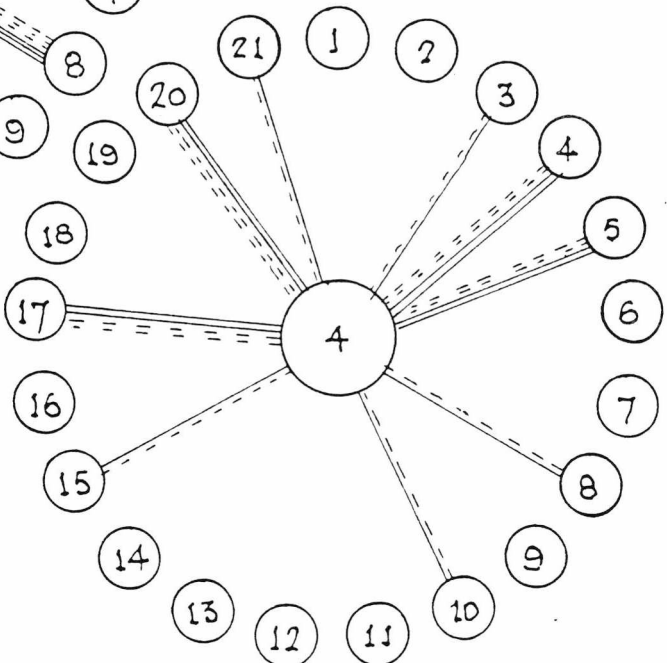
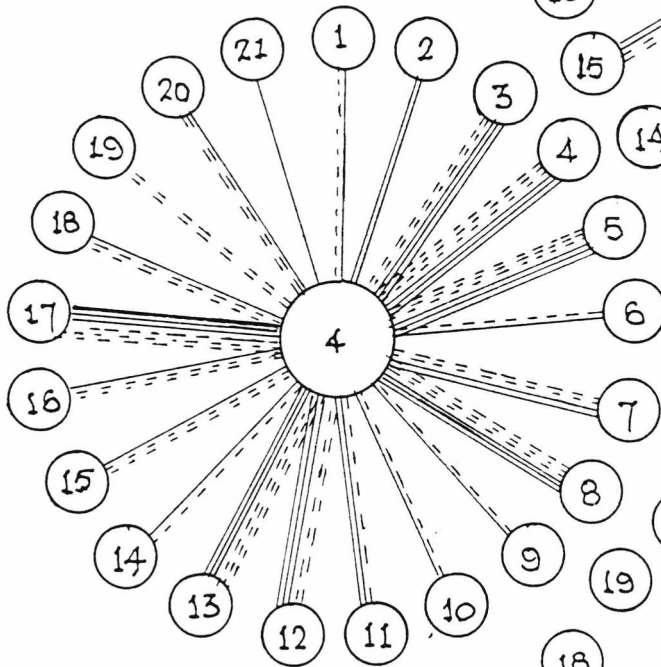
COMMAND ▲

ADVICE ▼



INFORMATION ▲

SOCIAL ▼



KEY

— 1/yr = Yearly
 == 12/yr = Monthly
 === 48/yr = Weekly
 ===== 240/yr = Daily

Solid Lines: from focal person
to role set

Dotted Lines: from role set
to focal person.

FIG 6-9 COMMUNICATION

WITH 'ROLE SET' OF NODE

7 (Senior Gp. Engineer
Design & Construction)

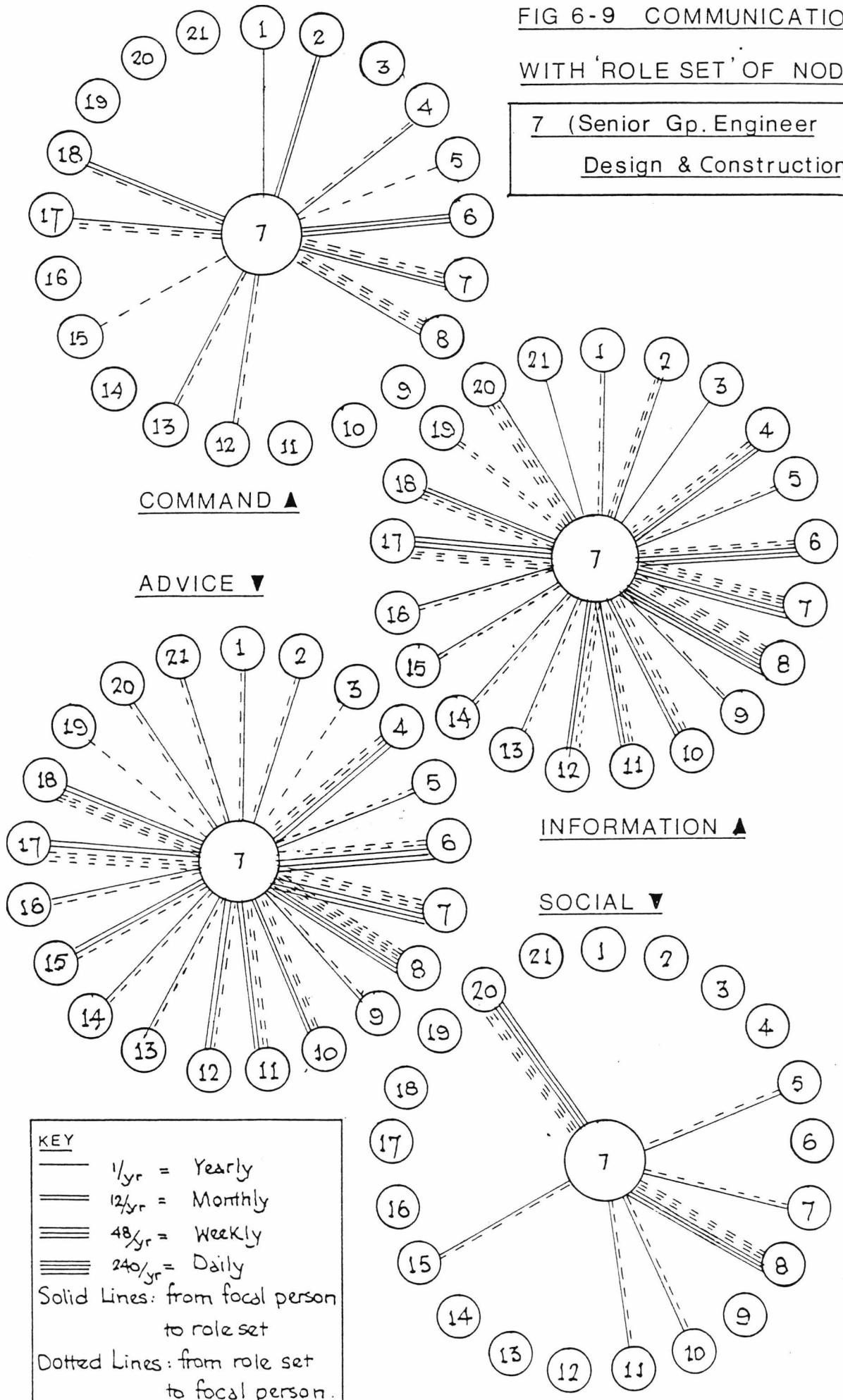
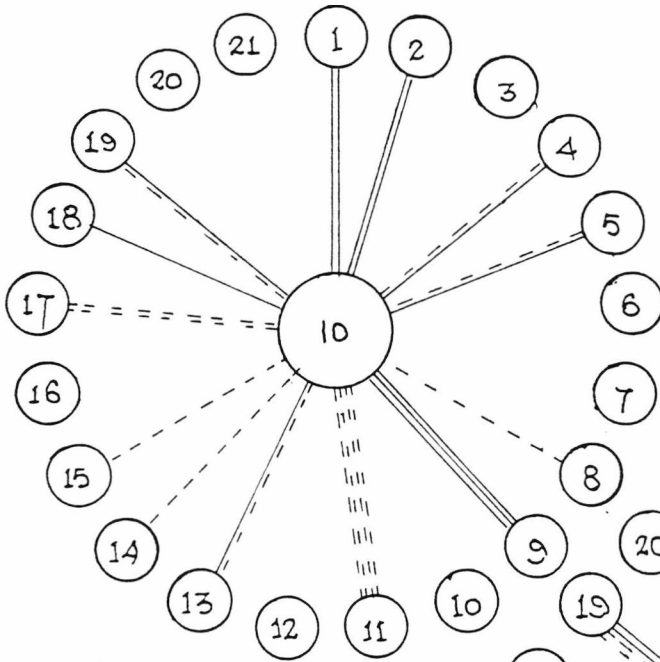


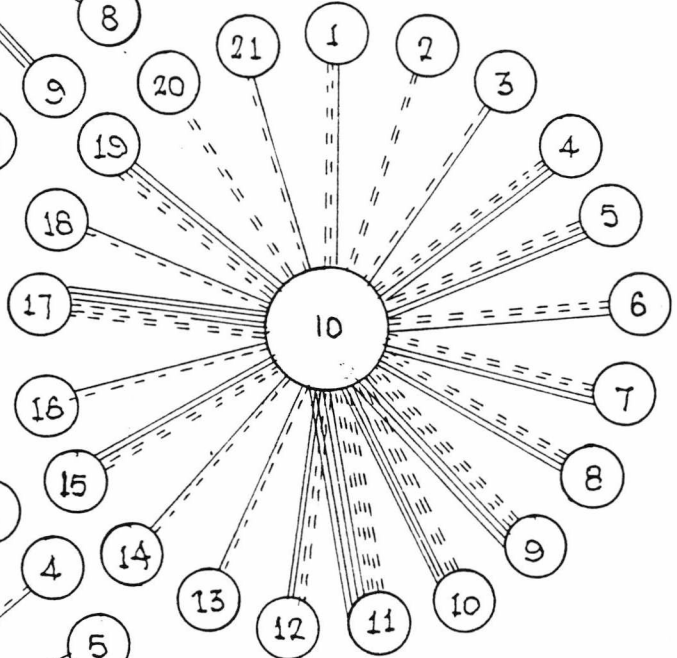
FIG 6-10 COMMUNICATION
WITH 'ROLE SET' OF NODE

10 (Senior Gp. Engineer
Transportation)

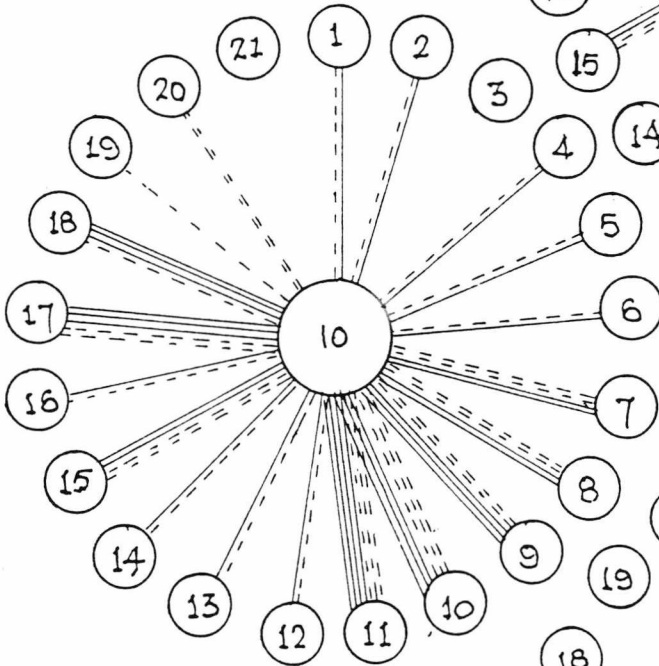


COMMAND ▲

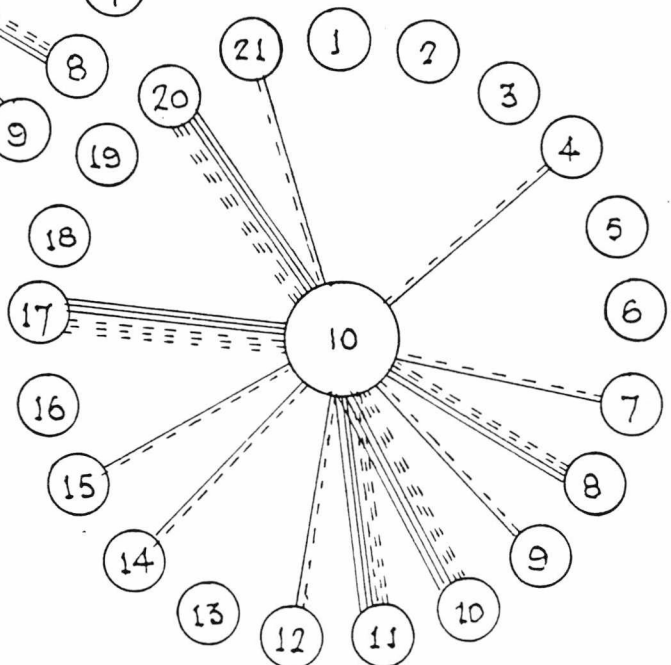
ADVICE ▼



INFORMATION ▲



SOCIAL ▼

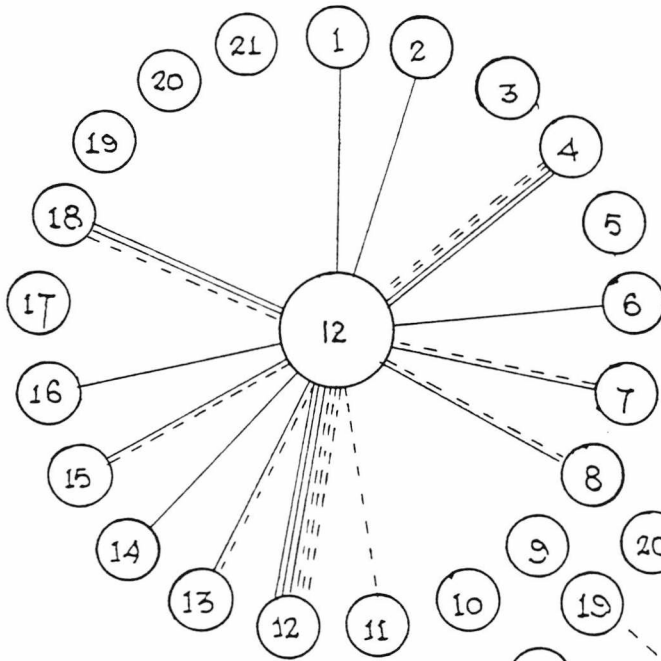


KEY

— 1/yr = Yearly
 == 12/yr = Monthly
 === 48/yr = Weekly
 ===== 240/yr = Daily
 Solid Lines: from focal person
 to role set
 Dotted Lines: from role set
 to focal person.

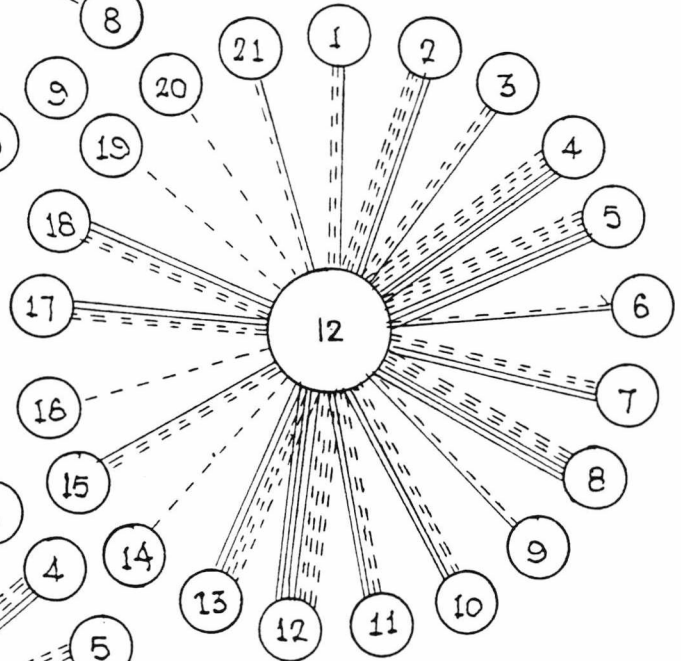
FIG 6-11 COMMUNICATION
WITH 'ROLE SET' OF NODE

12 (Highways Laboratory
Senior Engineer)

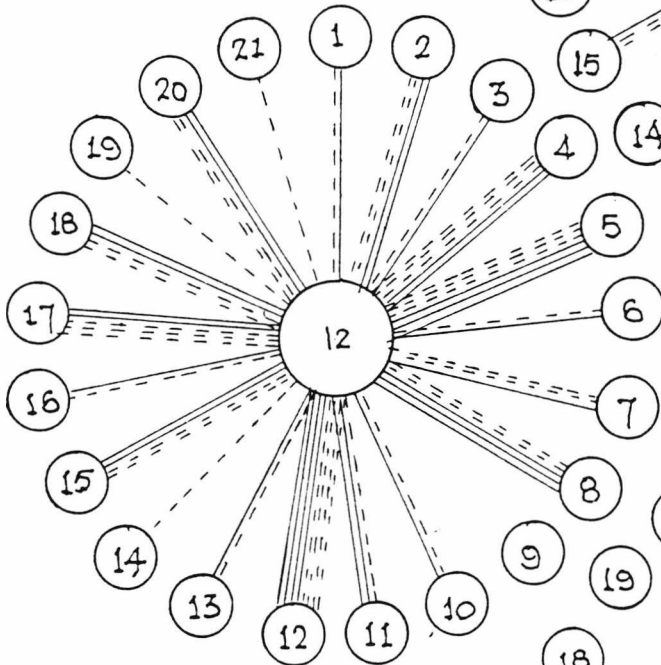


COMMAND ▲

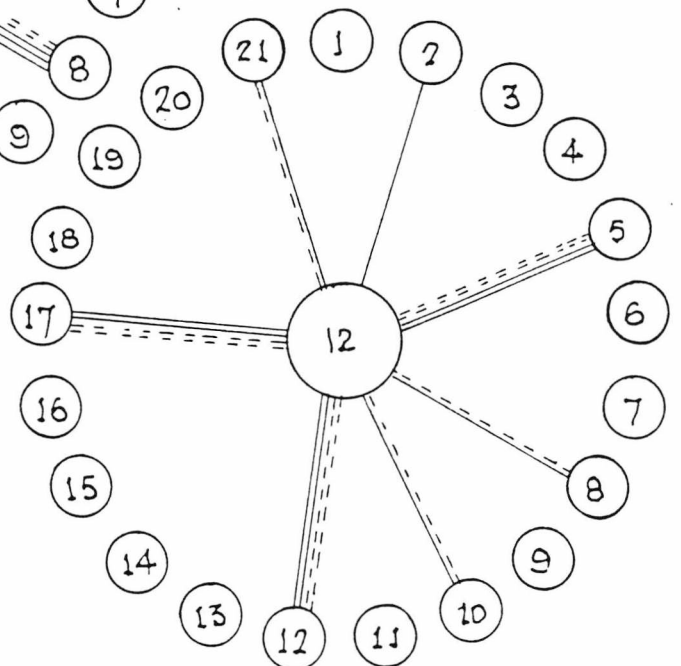
ADVICE ▼



INFORMATION ▲



SOCIAL ▼



KEY

— 1/yr = Yearly

== 12/yr = Monthly

=== 48/yr = Weekly

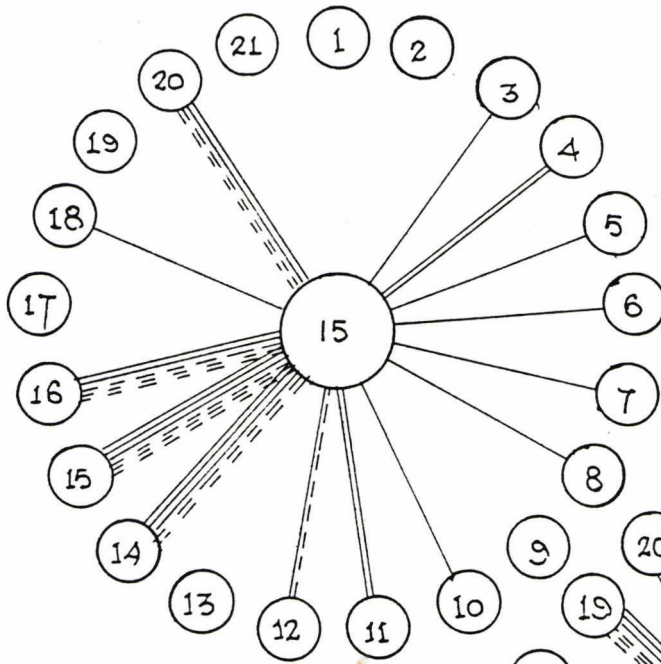
==== 240/yr = Daily

Solid Lines: from focal person
to role set

Dotted Lines: from role set
to focal person.

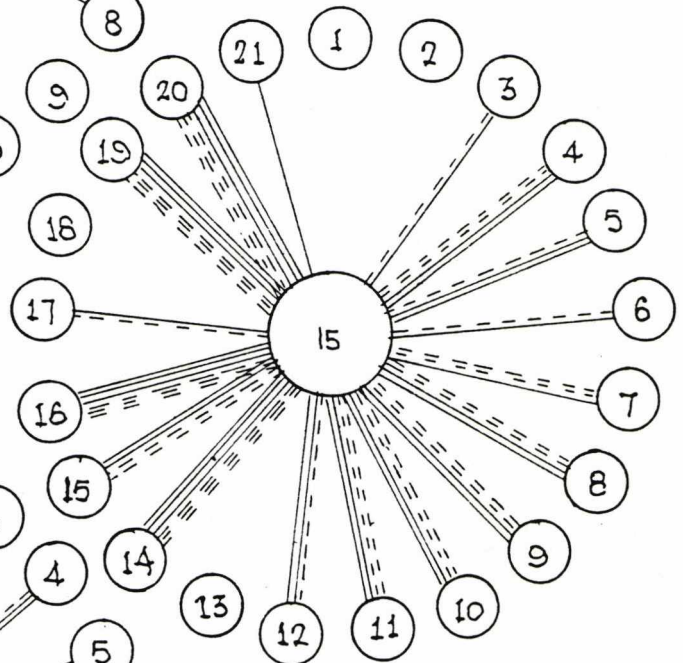
FIG 6-12 COMMUNICATION
WITH 'ROLE SET' OF NODE

15 (District Senior
Design Engineer)

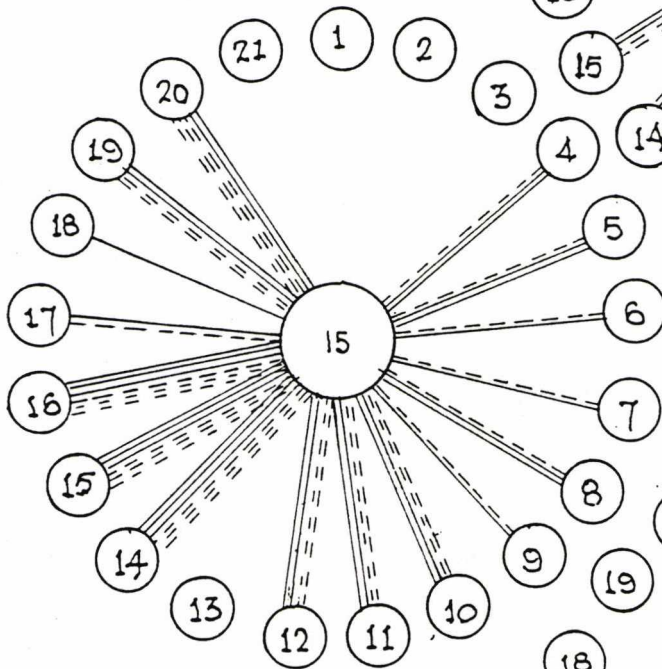


COMMAND ▲

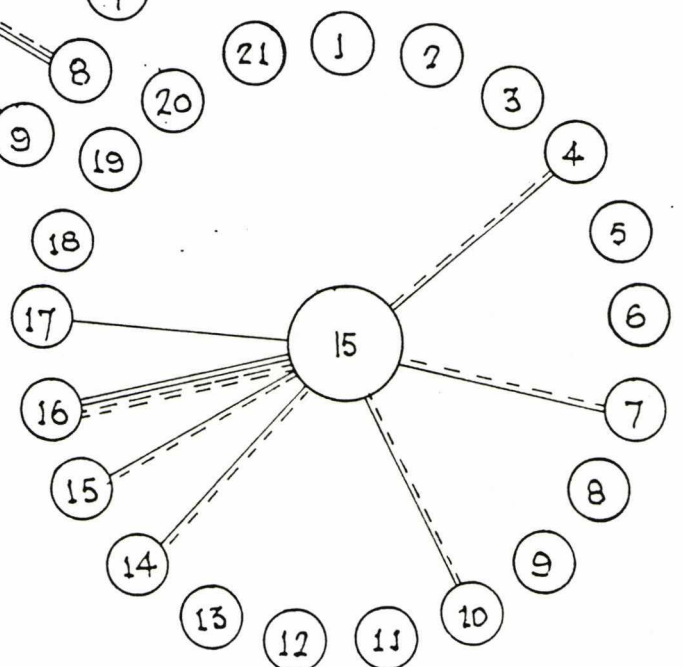
ADVICE ▼



INFORMATION ▲



SOCIAL ▼



KEY

— 1/yr = Yearly
 == 12/yr = Monthly
 === 48/yr = Weekly
 ===== 240/yr = Daily
 Solid Lines: from focal person
 to role set
 Dotted Lines: from role set
 to focal person.

The frequency and direction of the links is identified in accordance with the key on the diagrams.

To assist analysis of these diagrams a numerical abstract was made to show the extent to which individuals' contacts are predominantly within their branches, or with other branches in the same organisation, or with other nodes outside their organisation. These figures are summarised in Figure 6.13 - again by function of link. This numerical abstract and the star diagrams provide a basis for considering each of the five selected individuals in turn. The object will be to determine which are the significant links in their authority, technical and social networks, and what indications these give of the differing influences developed by, and acting on, the working groups they represent.

6.2.4. Links to Senior Group Engineers, Direct Works Branch (Figure 6.8)

From the star diagram in Figure 6.8 it is clear that, for Senior Group Engineers in the Direct Works Branch, the command (authority) network differs from the information and advice (technical) networks. Frequencies are higher in the technical network and are rather more concentrated in the right hand (departmental) quadrant. By comparison the command network has greater density in the left hand quadrant which shows links outside the department. The social network of individuals is sparse, with few links inside the department other than with members of their own branch. Commands are primarily coming from outside the department or from the branch head. Commands issued are primarily hierarchical - down to the next-in-line (section engineers in Direct Works branch) - support branches (finance and Laboratory), other county support branches, and engineers in district design offices. In contrast dominant links for information and advice are reciprocal and

Individual	Links	Commands Frequency				Advice Frequency				Information Frequency				Socialisation F.	
		Received	%	Given	%	Received	%	Given	%	Received	%	Given	%	Frequency	%
4 (Senior Gp. Eng. Direct Works Branch)	With Own Branch	96	22	202	52	376	49	384	40	427	39	377	36	70	64
	With Other Branches	56	13	57	15	211	28	175	18	263	24	229	22	4	4
	Outside Department	285	65	130	33	179	23	396	42	400	37	427	42	36	32
	Total per Year	437	100	391	100	766	100	955	100	1090	100	1033	100	110	100
7 (Senior Gp. Eng. Design & Const. Branch)	With Own Branch	79	57	332	88	274	52	334	49	445	61	419	54	93	65
	With Other Branches	2	1	4	1	106	20	91	13	109	15	103	13	18	13
	Outside Department	59	42	40	11	147	28	263	38	177	24	253	33	32	22
	Total per Year	140	100	376	100	527	100	688	100	731	100	775	100	143	100
10 (Senior Gp. Eng. Transportation Branch)	With Own Branch	148	73	290	83	449	68	285	60	571	65	571	60	133	45
	With Other Branches	10	5	12	3	53	8	62	14	107	12	106	11	24	8
	Outside Department	45	22	41	12	159	24	124	28	204	23	270	29	139	47
	Total per Year	203	100	343	100	664	100	451	100	882	100	947	100	296	100
12 (Senior Engineer Highways Laboratory)	With Own Branch	168	63	168	75	240	39	240	33	240	35	240	23	20	28
	With Other Branches	62	24	48	22	249	40	242	33	343	50	526	50	30	42
	Outside Department	35	13	6	3	136	21	245	34	100	15	292	27	21	30
	Total per Year	265	100	222	100	625	100	727	100	683	100	1058	100	71	100
15 (District Design Staff)	With Own Department	200	70	189	91	202	58	223	43	198	40	213	39	23	70
	With County	48	17	2	1	98	28	53	10	113	22	141	26	10	30
	Outside Both Authorities	37	13	16	8	50	14	248	47	193	38	192	35	-	-
	Total per Year	285	100	207	100	350	100	524	100	503	100	546	100	33	100

FIG 6-13 COMMUNICATION WITH SELECTED INDIVIDUALS - Frequencies in events per year

within the branch or with the other branch working on the road network, Design and Construction. Figure 6.13 confirms that there are higher density links within officers' own branch than with other branches, but also illustrates the unusually high volume of communication outside the department, particularly with the general public.

Within the department the highest rate of interaction with other branches is a balanced link with the Design and Construction branch and the second highest is a virtually one-way link with the Laboratory. These are service links, providing design support to the Direct Works branch structural maintenance programme, coordination with the Design and Construction branch capital works programme, and technical support from the Laboratory with regard to materials and highway conditions. There is little contact with the Transportation branch.

In summary, therefore, one might conclude that the Direct Works branch is exposed to authority and public pressures from outside the department, has strong intra-branch links, has quite frequent and balanced links with the Design and Construction branch, is little influenced by the Transportation branch, and has a more frequent and relatively unbalanced link to the Laboratory. Having regard to the specialist nature of the Laboratory, and that more advice and information is received than given, one might anticipate some tension in the relationship.

6.2.5. Links to Senior Group Engineers, Design and Construction Branch (Fig. 6.9)

Considering Figure 6.9 it is clear that Design and Construction branch managers felt themselves to be less exposed to external authority (command) pressure than Direct Works branch staff of similar standing. In general the networks are less dense and give the

impression that the technical (advice and information) links are rather more evenly spread around the role set. The social network is as sparse, but with a stronger emphasis on social links outside the organisation.

From Figure 6.13 it is clear that the major authority links are within the department, indeed within the branch. The branch head is the most frequent authority link, with some influence from the Deputy County Surveyor. The agency links upwards to the Department of Transport and downwards to the District Technical officers are apparent. The high level of commands issued to other County departments reflect contact with the Estates Department and County Solicitors for land acquisition.

As with the Direct Works branch the strongest links are within the branch for technical purposes, but in this case the inter-branch links are also more frequent than the sum of those outside the department (Figure 6.13). Apart from the inter-branch links, the highest frequencies for advice and information are in the link to the Department of Transport (for agency work on Trunk roads), other County departments (primarily for statutory procedures and land acquisition) and, to a lesser extent than Direct Works branch personnel, the general public. The interdepartmental links show a balanced interdependence with the Direct Works branch, a balanced exchange of information with the Transportation branch and the Laboratory, but an imbalanced exchange of advice with both of these two groups. This again could be a cause of tension.

In summary, the Design and Construction branch appears to be rather less exposed to external influence than the Direct Works branch, to have close internal links, to be more dependent on the

Transportation branch but less on the Laboratory for advice, and to have less communication with the general public. It is marginally more active socially, and overall gives the impression of a tight-knit, technically differentiated group.

6.2.6. Links to Senior Group Engineers, Transportation Branch (Figure 6.10)

The overall impression of the role set diagrams on Figure 6.10 is of a similar density and spread in the technical and authority networks to the Design and Construction branch, and hence similar differences to the Direct Works branch. In this context it is interesting to note that the total frequency of command links to Direct Works branch senior group engineers is 437 whilst for Design and Construction branch staff in a similar position the figure is 140 and in the Transportation branch 203. The social network in Transportation is the strongest of the three so far considered, with a total of 296 compared to 143 in the Design and Construction branch and 110 in Direct Works.

It will be noted from Figure 6.10 that the authority (command) network is, for instructions received, the most hierarchical within the five groups analysed, with the branch head, County Surveyor, Deputy County Surveyor and Members among the five most frequent links which in turn represents 96% of the commands received linkages. Commands issued have a wider spread but at low frequencies only, the main link being to the next tier of officers in the branch, the section engineers. Considering the advice and information networks, it is clear that intra-branch communication dominates, with the branch head playing a more prominent role than in the previous two branches. Apart from other county departments (particularly the County Planning Department for development control work), the most frequent outside links are the Department of Transport, District Technical Officers and other

branches. Figure 6.13 clarifies these relationships. A high proportion of links will be seen to be within the branch, with the most frequent inter-branch link to the Design and Construction branch. The figures confirm that the information link is unbalanced with more given than received. Links outside the department are relatively low, with some contact with the public to provide information. There is a stronger social structure within the branch reflecting the dominant intra-branch technical links, but also with other departments possibly reflecting a lower average age of senior officers in the branch, and greater involvement in authority-wide sports clubs and social events. It is surprising to note from Figure 6.13 the low level of contact with the Laboratory.

Summarising, the figures indicate that the branch is a self-contained specialist organisation, with its members having relatively loose coupling to other branches and departments, but a strong authority link up through the branch head to the County Surveyor and hence Members. The strongest inter-branch link is to the Design and Construction branch, with a similar frequency link to District Technical offices. Surprisingly, this is a stronger technical link with the Districts than for the Direct Works branch. It will be recalled that initially, in 1974, the sole link with the Districts was intended to be through the Direct Works branch.

6.2.7. Links to Senior Engineer in Highways Laboratory (Figure 6.11)

Considering Figure 6.11 it appears that the authority links are following a similar, though less dense, pattern as the technical (information and advice) links. The latter two appear to have similar densities to the previous two branches, but to have links which are more evenly distributed between other branches. The social network is

as sparse as for other branches.

Figure 6.13 illustrates the extent to which the Materials branch based on the Highways Laboratory is in contact with other branches. Technical links within the branch are only about a third of the total links (in contrast with other branches where internal links dominate). There are as many links with other branches, particularly Direct Works, and almost as many again outside the department. Clearly the branch is a net transmitter of advice within and without the department and, as one would expect, a strong net transmitter of information. Outside the Laboratory itself the most frequent links are to all three branches, and also to the Department of Transport and District Technical offices. It is the only branch with significant links to local professional institutions.

The picture which emerges is of a strong support service activity "under instruction" from other functional branches, and open to influence from, and able to influence, other branches, departments and organisations in the technical network. It is interesting to compare those links with those for the Transportation branch, which, though it might be thought to be providing a similar service as a source of information and advice, has a greater emphasis on internal linkage, and a clearer authority link to senior management. By contrast the Laboratory has a more diffuse authority linkage, and weak links to the general public and members.

6.2.8. Links to Senior Engineers in District Technical Offices (Figure 6.12)

From an inspection of Figure 6.12 it is clear that command links are primarily concentrated within district authorities, with strong links to Members. To some extent this pattern is repeated for

information and advice, with, as a result, greater density in the left hand quadrants of the circles. It should be borne in mind that the work of these district officers is closest in character to that of the Senior Group Engineers in the Design and Construction branch - consisting of the design and construction of routine capital works.

Comparing the Senior Group Engineers in the Design and Construction branch (Figure 6.9) with these District engineers, it will be seen that the authority networks are similarly hierarchical with, in the case of District staff, more contact with senior management because of their smaller numbers. The general public is also considered to be more a part of the authority network in Districts and it will be seen from Figure 6.13 that the authority link with the County is virtually uni-directional. The noticeable features of the advice and information networks is the very significant role played by elected Members and the general public. The sum of links to Members and to the general public generally exceeds the frequency links to other members of their own department.

Reverting to Figure 6.12 it can be seen that there is regular contact with the County, but the surprising feature is that for all functions the most frequent link is to the Transportation branch, though it should be noted that these links are relatively balanced. By contrast the advice links with the Design and Construction branch and the Direct Works branch are unbalanced, and Districts are net receivers of advice from these two quarters. Again, it is surprising to note the relatively low frequency of contact with Materials branch personnel at the Highway Laboratory.

In summary, the District offices appear to be more closely coupled to Members and the public than County offices, with quite diffuse links

to the County department. One might anticipate those to the Direct Works and Design and Construction branches to be subject to some tension because of their lack of balance, but one could also anticipate some tension within the highways department in view of the evidence of the unexpectedly strong links to the Transportation branch - certainly stronger than was anticipated at the time of reorganisation.

6.2.9. Individual Links - Conclusions

A more exhaustive study would reveal more of the subtleties of the individual relationships. At this stage, however, the principal point of interest is the extent to which contact with other nodes in the networks appear to constrain the selected individuals and the groups which they represent - the extent to which the links influence their respective action space. Figure 6.13 is helpful in this respect.

The Direct Works representatives must clearly be constrained along the authority axis by the high proportion of command links emanating outside the department, colouring their formal role. On the other hand commands issued are primarily contained within the branch, minimising the overlap with others in the organisation. Advice links will constrain the technical boundary of their action space more than information links (because differing values may be involved in the interchange) and there is clearly some overlap in this dimension (though almost 50% of links are contained in the branch). However most of the links outside the branch are for administrative rather than technical purposes, and we can envisage the branch pursuing its own technical goals little influenced by other technical branches.

The Design and Construction branch is less influenced by outsiders in the authority network, and links are more hierarchical than for the Direct Works branch. There is accordingly less constraint on the

branch members' action space along the authority dimension. The branch is marginally more self contained than the Direct Works branch along the technical axis, and those links which are outside the organisation are dominated by relationships with like-minded engineers in the Department of Transport or other County offices providing a support service. Although, therefore, there is a measure of overlap along the technical dimension it may facilitate as much as constrain the group's activity. Social links are sparse, but there is contact with the public which may amount to an enlargement of the departmental social network.

The Transportation branch is dominated by hierarchical links in the authority network and might therefore be anticipated to have considerable discretion along this dimension. It is the only branch which is a net "exporter" of advice and will therefore have enlarged its action space along the technical dimension into that of other branches. It has the densest technical links within the branch, and should therefore have clearly defined technical values little influenced by those of colleagues in other groups or those outside the organisation. The strength of the links and associated action space overlap with District Technical offices is notable.

One might expect the Highways Laboratory to have a similar degree of discretion since it fulfils a similar advisory and technical support role. However it will be noted that it has the highest density of authority links from other branches and accordingly is more constrained by them along the authority axis. The diffusion of its advice and information links is also noteworthy and it is clearly the most "open" branch in relation to others inside and outside the organisation. The technical boundary of its action space is therefore characterised by multiple overlaps with other branches in this dimension. However the strong involvement outside the department compensates for this to make

the branch a net "exporter" of information and advice with a consequential enlargement of its action space. Socially the network is equally (and consequentially?) diffuse.

Technical staff in Districts show a strongly hierarchical authority network, with a strong constraint from links (of "commands received") from the County. The advice and information links have most in common with the Direct Works branch though their "advice received" is primarily along non-technical links. One may therefore visualise them operating in an organisation-centred technical action space with surprisingly little overlap with County branches. This overlap is more noticeable on the authority dimension, though district organisation values will still dominate.

Personal interviews were carried out to explore individual's perceptions of their working lives within these action spaces. Before reporting them, however, reference must be made to two questions regarding personal perceptions which were posed in the questionnaire.

6.2.10. Questionnaire responses regarding change and job satisfaction

While asking individuals to answer questions regarding their links to others in the network of people engaged in highway tasks in the County, it was thought to be of value to question them on sources of change in their environment, and of satisfaction in their job. If these factors were dependent on their relationship with others it was anticipated that this might show through in responses made in the context of a questionnaire primarily concerned with relationships with others. In the event there was an equally wide range of sources attributed to change and job satisfaction on the questionnaires as in subsequent responses in personal interviews.

Replies to the question "What change has affected you most significantly?" are summarised in Figure 6.14 (using similar categories of change as those used in Chapter 4). Replies to the questions "What has given you most dissatisfaction and frustration at work since 1974?" and "What has given you most satisfaction and sense of achievement at work since 1974?" are summarised in Figure 6.15. Because they augment the replies in personal interviews these two sets of results from the questionnaires and some of the individual responses, will be referred to in sections 6.3.1. - 6.3.5. below, reporting the interview findings.

6.3. INDIVIDUAL INTERVIEWS

Individual interviews were held over an extended period. Owing to the commitments of the author and the onset of a period of particular uncertainty in the department some interviews were deferred until a period of stability was regained. It was not felt that this period of about a year would have any major impact on individual's perceptions which had, of course, built up over periods generally of some 20 years in local government.

The object of the interview was first to discuss the individual's own job - its objectives and value to him and, as he saw it, to the community and his own sources of job satisfaction - in more detail than was possible on the questionnaire. The second purpose was to determine which of the main groups considered in this study the individual came into contact with, and what he considered their objectives were, the extent of their involvement in his work, the change in their involvement over the years, and the effect of the relationship on his job satisfaction.

Reported By Perceived Source of Change	Group (B) Direct Wks		Group (C) Design & Cons ¹		Group (D) Transportation		Group (12) Laboratory		Group (E) District Staff		All Respondents	
	Reports	%	Reports	%	Reports	%	Reports	%	Reports	%	Reports	%
<u>Economic Factors :-</u>												
Reduced Finance	4	28	9	35	2	28	-	-	5	15	20	24
Growth of Heavy Lorries	-	-	-	-	-	-	-	-	-	-	-	-
<u>Technical Factors :-</u>												
Computers	-	-	3	12	1	14	-	-	-	-	4	5
Optimization	-	-	2	8	-	-	-	-	-	-	2	2
<u>Social Factors :-</u>												
Public Awareness	-	-	1	3	1	14	-	-	1	3	3	3
<u>Political Factors :-</u>												
Economic Legislation	1	7	1	3	1	14	2	50	10	29	15	18
Social Legislation	-	-	-	-	-	-	-	-	-	-	-	-
Politicians Involvement	3	21	3	12	-	-	1	25	4	12	11	13
<u>Organisational Factors</u>	6	43	7	27	2	29	1	25	14	41	30	35
Totals :-	14	100	26	100	7	100	4	100	34	100	85	100

FIG 6-14 INDIVIDUALS' PERCEPTIONS OF CHANGE

Reported By ► Reported Source of Satisfaction or Dissatisfn.	Group (B) Direct Works				Group (C) Design & Const. ⁿ				Group (D) Transportation				Group (12) Laboratory				Group (E) District Staff.				All Respondents			
	+	%	-	%	+	%	-	%	+	%	-	%	+	%	-	%	+	%	-	%	+	%	-	%
The Physical End Product	2	13	-	-	6	24	1	4	3	50	-	-	1	20	-	-	2	8	-	-	14	18	1	1
Managing Production System	4	25	-	-	8	32	3	13	1	17	-	-	1	20	-	-	4	16	-	-	18	23	3	4
Managing Service System.	5	31	-	-	3	12	-	-	-	-	-	-	2	40	-	-	6	23	1	4	16	20	1	1
Managing and Motivating People	2	13	1	4	-	-	-	-	-	-	-	-	-	-	-	-	5	19	-	-	8	10	-	-
Increased Responsibility	1	6	-	-	3	12	-	-	-	-	-	-	-	-	-	-	4	15	-	-	8	10	-	-
Achieving Economy	1	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4	15	-	-	5	8	-	-
Gaining Acceptance and Recognition	1	6	1	6	4	16	2	8	2	33	-	-	1	20	-	-	1	4	2	7	9	11	5	6
Increased Involvement of Politicians	-	-	1	8	-	-	-	-	-	-	-	-	-	-	1	25	-	-	2	7	-	-	4	5
Loss of Individual Autonomy	-	-	2	11	-	-	1	4	-	-	-	-	-	-	-	-	-	-	3	11	-	-	6	8
Loss of Organisation's Autonomy	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4	14	-	-	4	5
Paperwork and Control Processes	-	-	1	5	-	-	7	30	-	-	1	17	-	-	1	25	-	-	5	18	-	-	15	19
Lack of Finance	-	-	5	28	-	-	2	8	-	-	-	-	-	-	-	-	-	-	9	32	-	-	16	20
Decision Making Process	-	-	8	44	-	-	6	25	-	-	4	67	-	-	-	-	-	-	2	7	-	-	20	25
Insecurity	-	-	-	-	-	-	2	8	-	-	1	16	-	-	2	50	-	-	-	-	-	-	5	6
Totals	16	100	18	100	25	100	24	100	6	100	6	100	5	100	4	100	26	100	28	100	78	100	80	100

FIG 6-15 INDIVIDUALS' REPORTED SOURCES OF SATISFACTION (+) AND DISSATISFACTION (-)

Twenty-nine interviews were held lasting about an hour. Tape recordings were not made but notes were completed as soon as possible after the interview. After the first ones had been completed an interview record sheet was prepared to standardise recording and is shown in the Appendix Fig. A.12. It will be noted that the discussion regarding job satisfaction included reference to six attributes of their job which interviewees were asked to put in order of value to them. This was intended to replicate, in a simplified manner, the investigation of Perrucci and Gerstl (1969) into the bases of professionalism. They examined professional values in these six value areas by recording the percentages of engineers answering "very important to me personally" for items in each of the areas. Some 24 items were covered, grouped under six headings. Apart from the fact that the techniques would be tedious in an interview, being more suited to a questionnaire, the percentages for each item within group inevitably vary. This makes it difficult to rank the groups because one does not know what weight to give the individual items, not all of which are of the same significance. During the interviews only the six value areas were referred to, and a simple ordering of values by the individual requested. It was rarely necessary to discuss what items the value area might encompass.

As a senior officer in the department the author had both advantages and disadvantages at this stage of the study. Because of his knowledge of the department, districts and individual's duties it was not necessary to spend time in interview discussing the nature of the interviewee's job and background. On the other hand there may have been some hesitation to give frank replies to some questions owing to restraint between members of different branches and authorities at the time. Probably for an outside interviewer a two-stage interview would

have been necessary - one to discuss the job and gain the interviewee's confidence, and one to discuss his perceptions. Replies in the second phase might have been rather more open, but the author was not aware of any sense of guardedness during the interviews he held.

The twenty-nine interviews involved the numbers shown below for the relevant groups:-

Direct Works Branch	6
Design and Construction Branch	7
Transportation Branch	4
Laboratory	3
District Officers	5
Elected Members	4

Individuals in the first five groups shown above were selected to correspond as far as possible with the focal persons in Figures 6.8 - 6.12, viz. senior group engineers and group engineers in three County branches, senior engineers in the Laboratory, and senior design engineers in District Offices. Because of their significance for County and District officers, elected members were also interviewed, though the questions had, of course, to be adapted somewhat. The responses from each group will be considered in turn.

6.3.1. Interview Analysis - Direct Works Branch

The Direct Works branch interviewees were all directly concerned with highway maintenance, whether based at Division, Area or Headquarters offices. All had personal supervisory experience of the physical work of maintaining the highway, and the majority had, earlier in their careers, been involved with the design and construction of capital improvement works. All were chartered civil engineers.

When asked to define the objective of their work all identified with their branch, and in fact defined the objectives of the branch

rather than their individual activities. Three aspects were referred to: maintaining the existing highway efficiently within the resources available; providing a level of service for the travelling public; and maintaining public relations with residents and protecting their environment. The first related to the actual fabric of the highway rather than its use as a "track" for vehicular movement. "To do this job you've got to have a pride in, almost an affection for, the highways in your area", said one. Another commented, "You think: this is my patch and I'm going to make sure that the roads in it are as good as possible". The second aspect concerned the vehicles using the road, "You are providing a service to the travelling public - a response to public needs" - "I suppose the objective is to maintain and manage all public highways in Kent to a standard compatible with the needs and safety of the community". This led to the third and rather unexpected aspect: "To respond as the County Council's representative to complaints and requests for information" - "It's a P.R.O. job, it's a lot to do with the individual resident. This can cause conflict with higher management when those at the local level make promises which come into conflict with the centre's overall view". - "You try to allocate the majority of your funds for the maintenance of the fabric of the highway within the budget constraints, but you try to keep something back to be able to react to local pressures - the man with a pot-hole right outside his front door. You know if you don't act he'll be after you again in a fortnight and if you don't satisfy him then he'll write to his County Councillor to complain. And why not - repairing his bit of road is often the only direct return he gets from paying his rates".

These multiple objectives embracing the existing highways, the traffic on them, and the individual residents were reflected in replies

to the question "What do you think the value of your work is to the community?" - "It reduces losses, both in terms of time and accidents. But on the other hand it meets a perceived need by the individual: you've got to put yourself in his shoes" - "Accessibility for the public is important - the locals look for a quick response from the County Council at the local level". There was no doubt of the importance of the task. "It is vital to the community, if it is to thrive, to have a good network of roads. Without maintenance they will cease to exist, and the whole economy will fail".

But what of its value to the individuals concerned? This was clearly linked in their mind with job satisfaction, but self-expression was a vaguer concept. The job value was that "it enables me to make a contribution to society while earning a living" and that it gives "satisfaction at having got the best value for money for the ratepayers and the travelling public" - "It's the achievement of objectives effectively" - "and we mustn't ignore the fact that it's meeting an individual's want to be well thought of and praised". This led on to a discussion about the most satisfying (and dissatisfying) aspects of their job. It will be seen from Figure 6.15 that the major source of satisfaction reported on the questionnaires was managing the system to produce a physical end product or service, followed by the production of the end product itself, and managing people. The most potent sources of dissatisfaction were the shortage of finance to produce a service and the bureaucratic system. Thus a Direct Work respondent found satisfaction in the "maintenance of the style and general application to duty in the branch as a whole in spite of continuing change, criticism, and frustration", and another found "satisfaction that in spite of everything the branch as a whole has a firm dedication to the task and gives its full support whenever and wherever there is

real need". Dissatisfaction is shown with "lack of finance", "the idiosyncracies of the department's bureaucratic system", and "lack of defined authority and clear cut lines of command", or by "excessive control and lack of service from so-called service sections and departments". In the personal interviews the majority of the topics raised in the questionnaire replies were referred to with an additional emphasis on "contact with people" - "contacting, and maintaining a continued relationship with the public". There was the same emphasis on managing the system. "There's satisfaction in running a smooth machine - in motivating staff to try to achieve the employers objectives, and just in dealing with people - not just the technical side. You have to feel a good service is being provided". Dissatisfaction was expressed over the "failure to achieve" - to have "responsibility without authority" or, more specifically, "It's been worse over the past two years. There's been political interference by people who don't know what they are talking about - too many inquests into trivial matters, little thanks, and consequently no job satisfaction". - "There's just too much administration and not enough management".

Certainly there was an awareness that the nature of their job satisfaction and the job itself had changed over the years. It will be recalled from Figure 6.14 that branch members were most aware of organisational change. Some had, in fact, been promoted during that time, and had moved from an operational job with a direct end product in the form of a length of improved road, to an administrative, management role. No-one said that their job satisfaction had reduced overall - rather that they now found it in other directions. "I now find satisfaction just in balancing the books - in spite of everything - and in contact with others" - "I think the challenge and consequently

satisfaction - has increased because of the difficulties. With inflation you've got to justify every penny which is spent". "You just have to accept the political reality".

Clearly the degree of satisfaction the engineers gain from their work is linked to the valencies of its various attributes. Perruci and Gerstl (1969) found that "the challenge value seems to be clearly most important to engineers, reflecting the intrinsic appeal of their work. Advancement and autonomy values are second and third, with little difference between the two. Colleague values rank fourth in importance and professional community values and knowledge values rank a distant fifth and sixth" (p. 100 - 101). A similar pattern was reflected in respondents' ranking of these six attributes. Challenge was the most valued attribute, autonomy next, significantly ahead of advancement, with colleague, professional and experience values grouped together as fourth, fifth and sixth. The preference for autonomy over advancement is understandable in what has traditionally been a relatively independent appointment, and the lack of interest in engineering experience marks the managerial bias of the job. Respondents commented on the absence of "achievement" from the list and took "challenge" to be the closest value.

Because of the high value put on autonomy one would expect the respondents to be influenced by their contacts with other branches, particularly where these have the effect of constraining their activities. We have seen in Section 6.2.4. above that middle managers in the branch have frequent contact with the Design and Construction Branch, the Laboratory, and the general public. Contacts with the general public are obviously welcomed, indeed a specific source of job satisfaction. Contacts with the Design and Construction Branch appeared to be fairly neutral, balanced, service links, whilst those

with the Laboratory (and to a lesser extent, Transportation) included a higher element of authority and hence potentially constraint. It was therefore interesting to hear respondents perception of the objectives and influence of other branches.

The objective of the Design and Construction branch was deemed to be "to produce designs, documents and so on for the construction of roads and bridgeworks - in accordance with perceived needs and the economic use of resources". More generally it was felt to be "improving the highway network" - "with an emphasis on larger schemes". The branch was not considered to have very much influence over respondents activities - other than to provide a design service, and in the overlap of standards, and physical works of improvement and maintenance. It was seen to be a relationship which had grown closer over the years.

There was a stronger reaction to the Highways Laboratory. "They should be providing a service to provide information for design and assessment purposes, and to ensure that the materials used are within specification" - "Their objectives are a bit off-beam compared with Direct Works. Some have practical goals but others are merely data collectors". - "They provide a service of data for management decision - that's fine but they also want to interpret data and recommend policy". It was clearly this area of interpretation and recommendation where some friction arose. "They have an academic, perfectionist attitude. We must take a more pragmatic view of overall needs, priorities, and the use of resources" - "They have narrow, technical objectives. We must take account of a wider range of factors. They always give absolute advice and never take risk decisions on account of economic factors" - "The arguments are not over data but over interference in management decisions". This concern for data rather

than authority was reflected in engineer's perception of the change in the Laboratory's influence in recent years. On the positive side its service was seen to be "better - they have diversified and have greater technical know-how in an increasingly technical field". However there was still some reservation about the Laboratory's increasing technical authority. They have "progressed into a vacuum which they perceived in the interpretation of data on highway conditions and the recommendation of long term maintenance strategies. There's bound to be a conflict of roles as a result".

The Transportation branch was also seen as growing in influence. They were seen as a service branch. "Their objective is to provide a consultancy service for traffic data and traffic management", and principally concerned with the traffic on the road, with the objective of providing for "the safe and efficient movement of the public", or rather more abrasively "to define traffic needs and impose them on others whose preoccupation is the structure of the highway", and "to take a long term and somewhat academic view of strategies and programmes and to ensure that funds are used economically". It was not felt that the Transportation branch influenced the respondents very significantly, but it was accepted that its influence was increasing. "The T.P.P. process has allowed their expansion into other areas" - "There's a transition from a service branch into implementation - it grew out of the T.P.P." - "It's part of the attack on the generalist by the specialist". The general effect on individual's satisfaction was felt to be negligible or positive because of the facilities the branch provided. Difference related to "means rather than ends" and were resolved amicably by discussion. Concerning differences with specialists in general it was commented "It's over advice rather than data. You are concerned about the lack of experience of the adviser or

his lack of responsibility. Someone has to take a decision and it must be pragmatic and not based upon a blinkered approach. There are no clear, objective decisions. Only endless compromises. Of course you agree sometimes. You can't win them all - and all issues are not important. Sometimes there just isn't time to argue - and of course there are times when you lack confidence in your own opinion".

There was no indication that differences were referred up the hierarchy for resolutions - settlement was within the technical rather than the authority network. This was not the case with the general public. "If reasonable arguments fail then probably they refer to Members". The public was felt to be less tolerant, and more influential, but it was accepted that they could provide useful information. "They attempt to apply pressure to influence programmes, but everyone can't have a share of the cake" - "I think over time, they've got decreasing expectations with the worsening financial situation but they'll still do their best to get their local roads maintained and improved".

These pressures from the general public are, of course, focussed through elected Members. Some Members were felt to have a "genuine concern for the public service" - "to provide a local government service within a set budget and a determined policy". Rather less altruistically it was suggested that their objective was "to ensure that they stay in power" or that "their desire to look after local interests can be overtaken by political ambitions". Certainly "the dominant party wants to show that it is in control and is giving value for money". The influence of Members was universally felt to have increased "Yes, they've moved from a passive to an active role; and there's been a loss of managerial control to political leaders". This was a cause of dissatisfaction. "They are only here for a short while

- yet we have a long-term professional stake in the County. We as engineers cannot be perfect, but we are far more so than we are given credit for". Disagreements are resolved up the authority network - by reference to the County Surveyor or to Committee.

Naturally this changed Member involvement was seen as putting additional pressure on the County Surveyor. Although there was little direct contact with him he was seen as having similar objectives, and as providing the main link to Members and hence with the task of "satisfying the political masters", His involvement in national affairs was recognised and he influenced respondents through guidance and advice. On the few occasions it was exercised this had considerable impact but overall there was felt to be little change in his influence over the years.

Surprisingly there was little reaction to the District linkages. They were seen as having similar objectives, and generally striving to get the most money (and work) for their districts. This made it "difficult to share out the limited funds equitably", but generally they were endeavouring "to manage, within the agency terms, the highways within their district" - "They still look upon the roads as their roads and have had a loss of autonomy since 1974, rather like our own divisional surveyors. I think there's been a gradual clarification of our respective role" - "There's been a developing trust with Districts. It seems to me they are getting less political and the County is getting more". This increased political involvement in the County was reflected in the answers to the question "What do you think is the most significant change for highway engineers in recent years?" More generally there was emphasis on the "increased need for justification. Of course this is partly caused by the reduction in funds, but there is a general move to sophistication" - "Practical

experience and feel for the job are now lacking. In parts of the organisation we have tended to over-indulge in systems and so on with a consequent influx of staff which tends to cloud over the basic need". Perhaps this was why one respondent briefly replied "the biggest change is in the decline of the highway engineer's influence".

These observations help to fill out the picture of Direct Works branch officers as practical engineers with traditional values of service to the public and the care of the existing highway fabric. In their decision making they are becoming increasingly influenced by other groups such as the Laboratory, the Transportation branch and elected Members who are perceived as having differing technical, economic and political objectives. Although compromises are being worked out between the groups the need to do so is resented by Direct Works personnel and loss of job satisfaction has resulted. The branch is the longest standing branch in the department, having its origins in the organisation established in 1904. It is therefore right that it should form the basis against which the perceptions of the newer specialised branches and the District technical offices should be compared.

6.3.2. Interview Analysis - Design and Construction Branch

Those interviewed in the Design and Construction branch had long experience of highway and bridge design and works and all were chartered engineers. The majority had university educations but two had qualified via part-time study at technical colleges. In their mid-forties, they were now generally responsible for groups of up to 40 engineers in the office and on site, though one was a bridge specialist and one was responsible for project coordination and management support services. All had long service with the County and had clear-cut

concepts of the objective of their work: "the design and implementation of schemes for the replacement or improvement of roads, within financial constraints, to enhance the economy of the country". It was, however, accepted that many had a lower order goal which was simply "to get the design completed and to get out on site and build it". "I think we're dedicated civil engineers rather than road builders. It could be a railway or a dock - we're practitioners rather than specialist designers". Unusually, there was a measure of introspection. "It seems to me we are constrained by professionalism and practice. We're unimaginative, lacking in innovation, and have a rather restricted environment". There were, however, clear concepts of the value to the community: "increased safety, reduced journey time, savings in travel costs and an improved environment" - "We're creating a better transport system with a consequential saving in time and money - and don't overlook the fact that it enables people to do things they haven't been able to do before with enhanced safety. The benefits of mobility are enormous". And for the individuals there was the satisfaction of a physical and visible product for their efforts. "Its value to me is the pleasure of building something: seeing it constructed and leaving something positive behind. I'd hate to spend my life just handling money or transactions - or even in law. Having a physical end product is a tremendous satisfaction". "I'm thankful I'm employed in something positive rather than just passing the time" - "Job satisfaction? It's a sense of well being resulting from achievement" - "and getting the approval of people who matter". Typically, therefore, the most satisfying aspect of their job is "a job well done and acceptable to all, like bypass". And the most unsatisfying was "unproductive work" - "failing to achieve objectives" - "coping with unnecessary bureaucracy, and the Agency agreement with Districts". Relations come into it too: "One of the most

disappointing aspects of my work is when I fail to build up good working relationships with other branches". And the general public: "the most dissatisfying aspect of our work is the lack of appreciation by the public of the highway engineer's work in Local Government".

These replies reflected the "end product" orientation of questionnaire replies from members of the branch (Figure 6.15). The physical end product, or managing the organisational system to produce that end product dominated their replies, whilst paperwork and control and the growing complexity of the decision making process were major sources of dissatisfaction. Written responses had reference to "being closely involved in seeing a variety of construction sites (sic) to a successful conclusion" as a source of satisfaction, whilst "the ever increasing documentation and time-consuming paperwork" - "control systems" and the "continuous increase in the number and complexity of forms requiring to be completed" summarised the frustration of the designer with bureaucracy.

When their reactions to six attributes identified in the Perrucci and Gerstl study (see above) were analysed it was found that they differed from Direct Works staff, and from the original study findings. "Challenge" remained the highest value, but "engineering experience" was the next most valued attribute to them. "Autonomy" was third, "contact with colleagues" fourth, and "membership of the professional community", and "opportunities for advancement" sixth and fifth. This reflects the concern noted earlier for the techniques and practice of highway design and construction, and supports the "practitioner" categorisation.

The nature of their job satisfaction appeared to have changed somewhat over the years - "from enjoyment of the technical process to

the managerial process" - "from an immediate time horizon to a longer term one" - "Certainly there's been a change, and that in itself has been enjoyable. It's the satisfaction of achievement through others now, rather than your own personal project". "Promotion and a change in status is bound to change your job satisfaction. And you're having to cope with the increasing complexity and interdependence of life".

So what of those they come into contact with? From Section 6.2.5. above it will be recalled that middle managers in the branch share a service link with the Direct Works branch, have close links with the general public, and have an unbalanced advice and information link with the Transportation branch. Their concepts of Direct Works objectives and influence are neutral. "They have to safeguard the integrity of the highway network from day to day and act in a P.R.O. capacity. I think too they are trying to regain a lost role". "Their first allegiance is really to maintaining the status quo, and avoiding change". Though there had been greater involvement for the Design and Construction branch with the Direct Works branch in support of major structural maintenance works there was no sense of constraint in the linkage, indeed it was said to increase job satisfaction. The impression was that the Direct Works branch was less influential in the department: "Twenty years ago the Direct Works branch dominated; ten years ago it was our branch. Now it's almost Transportation which dominates".

It is no surprise therefore that the attitudes to the Transportation branch are somewhat equivocal. "Their main object in life is producing policy documents" - "Their main emphasis is on traffic movement - using the existing road system to best advantage and establishing priorities". This led on an acknowledgement that the Transportation branch also had wider economic goals "to develop economic criteria and the optimum use of resources - arising from their

planning role and T.P.P. work". How did they influence the respondents in their work? "They are an irritant!" - "Their influence is increasing. They are seeking the optimum scheme from a theoretical standpoint without regard to practical and programming constraints" - "They increase my awareness of transportation and economic factors" - "They have a developing role, and are increasingly concerned with improvement policy matters - they have developed from purveyors of data, to planning for the future, to economic judge" - "and they've got this ability to manipulate data".

"Certainly there's a loss of job satisfaction because of this involvement with Transportation. Primarily because of the loss of autonomy, but also because it makes it more difficult to get the job done on time, and to get decisions. No one has the veto". Generally, though, differences are overcome by discussion and "by trade off. You've got to satisfy the other person's need for job satisfaction a little, whilst not reducing your own unduly" - "It's better now that our respective roles are established. We don't react so strongly now or try quite so hard" - "If the worst came to the worst we have to escalate the problem to a higher level of management where opinions are not so entrenched, or autonomy threatened".

The Design and Construction branch is also dependent on the Laboratory for information, but the relationship appears to be rather more relaxed. "Their object is to provide an investigatory and testing service, to ensure the safe design of earthworks and adequate materials" - "There's a good dialogue between us, so relationships are O.K. but there really has been an expansion of their influence. There's been the same progression from providing data to the interpretation of that data, and then to involvement in policy matters. I think that has been resisted by designers. And they can cause delay

because at certain stages you are dependent on them for data" - "Their influence has changed over the years; since the heyday of motorway building they have diversified into CHART work and so on. But they haven't achieved a real voice in policy making yet". There was no suggestion that this change in influence had an effect upon Design and Construction branch job satisfaction and indeed an acknowledgement that progress was so dependent on their specialist information that the relationship could increase job satisfaction.

The involvement with the public was more specific than for Direct Works. Particularly in improvement matters it was noted that "there is a changed public awareness of the environment - and changed public attitudes to highway work. We need their "grass-roots" feedback" - "They've influenced me to a considerable extent, by increasing my awareness of their dissatisfaction. They are much better informed on highway issues. It increases my job satisfaction when I know that the public accepts that you have done a good job" - "It was marvellous when we opened bypass and the public lined the route and cheered the first cars through". However, Members were not seen as quite the representatives of the public that they were in Direct Works branch. "I think some seek to achieve work for their own locality and hence gain influence locally" - "They have to satisfy the public that they are ensuring that we provide a cost effective service". Their influence was seen to be more exacting over the years, with greater influence on finance and accounting than on the finished product. There had been "increasing enquiries into details of our work, and there can be a loss of productive time dealing with their enquiries". However no-one referred to an increase in dissatisfaction and some found added satisfaction in the interest taken by Members in their activities.

Districts were felt to be more influenced by their own politicians. "Their offices have a more parochial, fire fighting role. They are obviously concerned to minimise delays and congestion in their town centre and to protect its fabric and residents" - "They are more open to local pressures, and more conscious of local feeling as a result. Their priorities are not objective and of course they have no economic constraints. They are just out to get as much as possible for their patch - and who can blame them?" The feedback on District needs was valued, and generally the professional relationship with them was felt to increase job satisfaction. "I think we've negotiated a balance with the Districts. We can't take away all decision making from them".

The most significant changes were considered to be economic (reflecting the written responses summarised in Figure 6.14) and the associated increased need for justification of priorities and expenditure. "We've gone from a period of expansion with ample funds to a contracting situation with scarce resources, and the need to make the best use of what exists. Hence the need for cost consciousness and efficiency, and with it the growth of the influence of Transportation".

One is left with an impression of a branch with a clear single objective to build roads and build well. Economically, yes, and in accordance with economic criteria, expenditure guide lines, and transport policies, but the physical end product remains the goal. Relationships with other branches and individuals are encouraged or tolerated if they will further that goal. Satisfaction grows or lessens in proportion to achievement, and on the whole morale appeared quite high. "Whatever else, we have an ability to get things done - to work our way through the maze of procedures to our objective. At the end of the day we're the only ones who will get it built".

6.3.3. Interview Analysis - Transportation Branch

The Transportation branch has a lower average age among its senior managers than the two previous branches described. Several of the seniors have second degrees or doctorates in the specialist field of transport planning and some have relatively slight experience of practical civil engineering. The branch covers a range of work from traffic modelling and forward planning to the installation of traffic signals. The respondents' concepts of the objective of their work was correspondingly broad. "We're trying to achieve a common level of service - the ordered movement of people and vehicles. We have to ensure that the whole budget is spent effectively" - "We have to stand back, look at a problem, and ensure that we progress in a rational, objective, manner" - "We fulfil a client role for the County Council in highway matters. Design and Construction branch's object is to build roads. We fulfil a service by deciding when they should not be built".

The value to the community was seen to be the saving of lives, and the reduction of congestion and, again, the longer term benefits of the wise and relatively unbiased use of public funds. "Technical vigour is on our side - we are the thinkers". This assurance came through in discussing the value of the work to them as individuals, and the sources of their satisfaction. "It's an intellectual challenge and stimulation" - "I have a need to plan, to make the County a better place to live in. I like to feel I'm playing a strategic role in achieving this" - "There's a great sense of satisfaction in achieving acceptance of your own views; bringing together a varied group of people and getting their acceptance for a particular strategy". Dissatisfaction arose from what might be termed intellectual dishonesty. "From the frustration of political decisions - the professional sell out. We really shouldn't make it easier for Members

who are prompted to reach a wrong decision or a compromise for political expediency. We must make the issues plain to them". Autonomy, too was valued: "To me dissatisfaction is excessive control or interference by superiors; a feeling that one's abilities are being stifled". Clearly here ideas were more important than physical end products.

Replies from the branch to similar enquiries on the questionnaire followed the same pattern (Figure 6.15). There was a higher desire for recognition than in other branches, and greater dissatisfaction with the decision making process. They found satisfaction in "getting original ideas accepted" and in "the opportunities I have had to address learned bodies and the communication I have with elected Members", but complain about "cumbersome procedures and the lack of quick firm management decisions".

Almost inevitably, for these engineers "challenge" remains the highest value, with "engineering experience", "advancement" and "autonomy" grouped together at some remove, and "professional" and "colleague" contact fifth and sixth. "You will realise that challenge is by far the most important of these, most of the remainder are hardly worth ranking". Certainly the challenges have been there in recent years. "The whole complexion of the job has changed. We've moved from model building to decision taking. From a twenty year time scale to a two year time scale. From macro models to micro models. From a support role to an implementation role". - "We've achieved increasing influence first through the T.P.P. and then by filling an organisational vacuum and achieving the growth of the corporate approach".

And what of their colleagues in other branches? It will be

recalled that none of the respondents from the Direct Works branch or Design and Construction branches appeared to share the Transportation branch members view that they had the corporate "client" role, with the overview of the whole budget and the task of achieving economic use of resources in all fields. Whilst all capital projects were required to be assessed for relative priority by the Transportation staff, no comparable means of assessment had yet been found for maintenance work - a larger annual investment. Nor were Transportation staff involved in decision making in that field - it remained a line-managers prerogative.

The Transportation branch "sanction" on improvement schemes had been approved by senior authority. Some ten years previously the County Surveyor had instructed that all improvement schemes submitted for committee approval should have been checked for layout and priority by the Transportation branch which had at about the same time been given responsibility for preparation of the annual T.P.P. submission. The branch therefore achieved the corporate role in the technical network it had been seeking for some time by the formal approval of the authority network. At the time of this study it felt the need for a wider strategic role in planning all forms of expenditure by the department, but had not yet achieved this because it had not been accepted by higher authority. In this sense the officers' conceptions of their role was ahead of authority's.

It will be recalled from Section 6.2.6. above that the Transportation branch managers have close links with senior management and the Districts in the authority network, and with the Design and Construction branch and the public in the technical networks. One would expect, therefore, that their conception of the Direct Works branch goals might be less certain than that of the Design and

Construction branch or of the Districts officers goals. The respondents view bear this out to some extent. It was suggested that the Direct Works goal was "rather a mystery, but I suspect that their decisions are sub optimal. They are very close to the grass roots, but as a result they don't stand back and examine problems" - "I don't think they've got an objective. Officially I suppose it is to maintain the integrity of the highway network, but that's a bit of a front. Their real goal is to keep their roads pot-hole free, and in better condition than their neighbour's. It's a matter of a stitch in time saves nine" - "They keep their heads down and go on as before - preserving the status quo".

Because the Transportation branch had been unable to gain influence over the maintenance tasks, respondents did not feel involved with Direct Works at all. They recognised, however, that their own objectives differed from the Direct Works managers. One referred to a recent disagreement between the branches over the extent of work which was justified on a major maintenance scheme which included elements of improvement work. "We had to get involved with that one, even though it's of only limited importance, because others would follow and if we lost that one we'd lose the lot".

There were clearer views regarding the Design and Construction branch. Their objective was viewed as being "to build the road schemes which they believed in" - "They're blinkered: they only see the highway engineering solution. It's a blanket approach to problems, without asking what the problem is". Perceptively "their objective is to exercise their expertise in building things - to get out and implement; to produce a good road to cure a problem, but it's not necessarily the best solution" - "They should take the consulting engineer role, but their tendency is to seek the client role as well".

The last comment is revealing. Transportation branch felt that it was the client branch, but this had not, at that time, been confirmed authoritatively. There was a high level of interdependence between the two branches and, inevitably, some differences of opinion over strategies, priorities, and solutions. These arose because of "differing points of view. The source of the disagreement is organisational: responsibilities are blurred. We have differing stores of knowledge, and the exercise of specialist knowledge always offends the generalist". Resolution is by "a rational appraisal of the strength of one's argument, and of the importance of getting your views accepted. Eventually you reach a compromise at your own level or by escalation to the branch head level". And if he gives way? "Well it's no good blaming him: that's a matter of the loser wanting to absolve himself from the responsibility of losing" - "People are reasonable really, and a consensus can usually be reached". It will be noted that there was no indication of an awareness that both branches were presumably working towards a common organisational objective. The disagreements were over means rather than ends.

There was little involvement with the Highway Laboratory and as a result fairly superficial views of their objectives emerged. "To run a professional consultancy service" - "To influence the work of Direct Works branch. After all, knowledge is power". The influence of the Laboratory was seen to be increasing, but this was seen to have no immediate effect upon Transportation branch at that time.

The branch has considerable involvement with Members, both on policy matters and local planning issues. "They've got double vision: the broad policy view, and the practical, local parochial view". - "They want to be objective, to serve the electorate, and to rule (and to be seen to rule) in harmony". The elected Members were felt to have

considerable influence on respondents' work, and this was considered to have grown and perhaps changed in nature over the years. "There's been greater Member involvement in reaching decisions - large and small. To show their influence over events". "All you can do is give them the facts; they are in charge after all". It was felt that their relationships with Members (as professional advisors) was different from that in Districts "The officers in Districts seem to see things the Members way. They never make a stand" - "They've very much the local view, and seem to take great delight in pursuing inter-authority rivalries". Hence perhaps one of the difficulties of being an expert is that it is hard to appreciate that others have differing, yet equally legitimate, objectives! The District officers reaction to the expert view will be indicated below.

Considering change in recent years most respondents concentrated on technical and economic change. "We've gone from number-crunchers to planners - a change of emphasis towards managing roads and traffic better". One engineer took a broader view "The highway engineer's work now is less glamorous; more bread and butter. Lower finance has led to increasing need for justification: the measure has become all. We've gone overboard on justification: it's become a crutch". (This preoccupation with technical change was somewhat at variance with the questionnaire responses (Figure 6.14) which showed greater awareness of organisational factors). As the wielder of that crutch the Transportation branch had clearly gained influence, and the assurance and intelligence of these somewhat younger engineers was impressive. In some areas they remained experts without a brief, and had some way to go before they gained their organisational objectives. However there was no doubt that they had a very clear concept of that goal - a goal which lay firmly in the authority network.

6.3.4. Interview Analysis - Highways Laboratory

The Highways Laboratory staff interviewed had much in common with the Transportation staff referred to in the previous section. They too were rather younger than the respondents in the first two branches, and their responses reflected a desire to move from the position of an expert adviser to a corporate decision making role. Like the Transportation branch the Laboratory had its beginnings in the mid-1950's. Whilst Transportation had grown on the rising tide of local plan and structure plan work, the Laboratory had found its greatest strength during the major period of motorway building in the County in the late 1960's and early 1970's. With the decline in motorway work it had found and developed a new field in the objective assessment of highway conditions in the wake of the Marshall report. Because it had the resources it was able to take on this work rather than leaving it with the highway managers in the Direct Works branch.

The consultancy service role dominated in respondents' view of the Laboratory's objectives "To provide a specialist consultancy service in geotechnical, material, and road condition assessment - on a cost effective basis". Its value to the community was that it "ensures that the capital value of the highway asset is maintained and enhanced effectively" - "It gives the public confidence that works are designed safely, economically, and in sympathy with the environment". The sources of job satisfaction were more varied: "using my talents and experience to the greatest advantage of society and our local community - with an eye for the future. Someone has got to be far sighted enough to see ahead". - "It's a great satisfaction to me to have used my ability and knowledge to communicate the important points arising from an investigation to the implementors themselves, and know they are accepted because they respect my knowledge and experience. I find

satisfaction in the meeting of minds - it's a team effort". For one it was breaking new ground "I'm balancing my interest in research against economic constraints. It's good to see the end result actually used". The most satisfying aspects of their work followed: "To see developments and predictions coming to fruition" - "Setting up a hypothesis and putting it to the test". And the most dissatisfying: "Political meddling; change for change's sake" - "It's the bureaucratic system: fighting your way through it to achieve an objective without being sure of the route". - "I get frustrated with the length of time taken to achieve objectives. It's all part of the Local Government system, it's lack of delegation. We're trying to run a private sector organisation here in a public sector environment".

The same satisfaction from gaining acceptance for views, and working within the system to produce an end product for service is reflected in the questionnaire replies (Figure 6.15). One engineer expressed satisfaction in "an overall improvement in the quality and efficiency of technical services offered by the highways Laboratory, together with the development of closer working relationships with design engineers". Surprisingly there was some dissatisfaction caused by a sense of insecurity and, more understandably, dissatisfaction with "the increasing amount of political dogma in policy-making and decision making, which often overrides economic and technical argument".

The respondents' ranking of the six professional value areas followed a similar pattern to that of other engineers interviewed with "challenge" very much the most valued. However, whilst the second most valued had been "autonomy" for Direct Works, and "engineering experience" for Design and Construction, it was "opportunities for advancement" in the Laboratory. This illustrates at least one aspect of the differences noted between respondents in the three groups. For

the Laboratory "experience" and "autonomy" ranked equal third, whilst contact with the "professional community" and "colleagues" ranked equal fifth. It was accepted that the nature of the job satisfaction had changed over the years, supported by greater confidence and greater experience. "I've certainly got greater understanding of others and their needs" - "The loss of contact with major schemes has been compensated for by involvement in the major maintenance field. It's been a real re-orientation to change to the longer economic horizon". For others in the Laboratory the change lies in other areas "I think the job has probably stayed the same: its the department that has changed round it. This has been due to forces both inside and outside the organisation" - "I think the privatisation of the R.C.U. work was significant. There's a clear potential for privatisation of other areas of the department's work". This awareness of political factors is reflected in questionnaire replies. And of course the Laboratory, in its consultancy service role, has to adopt the competitive criteria of the private sector and be very alive to the needs of other branches.

Their view of other branches' objectives were relatively neutral. There was obviously some concern at Direct Works' acceptance or otherwise of their views on the long term needs of highway maintenance. "They are very committed to the maintenance of the status quo" - "Their first objective seems to have been to protect their organisation and carry out those activities which the organisation could best cope with". The influence of the branch was seen to be decreasing. "I think they are losing the policy initiative. Life has become increasingly hard and I think we're beginning to have greater influence over the methods of decision making". If there was a basic difference of opinion however it was accepted that the Laboratory advice would occasionally be ignored.

The Transportation branch was looked upon as a purveyor of data, and accurately enough, as having the objective of "identifying and planning for change in the transport pattern, evaluating cost benefits, and ensuring that funds are used effectively". It was seen as having an increasing corporate planning role via the T.P.P. and the new found need for joint action. The Design and Construction branch, too was felt to be "becoming more corporate" and consequently as having rather less influence and autonomy. There was little contact with members of the public or elected Members. Accordingly there was no significant reaction to the manner in which Members goals might influence them in their work, and as a specialist branch, they were obviously more remote from political pressures. They were aware, however, of "a significant change in Members' involvement and interest: in implementation rather than just in policy matters" - "This government has put more teeth into the management role of Members, yet politicians can't be engineers any more than engineers can be politicians". - "This has caused a loss of professional standing. We as a profession really have not been skilled at dealing with the social and political environment". - "It's been a difficult time for senior management. They've got to ensure that the department carries out its function in accordance with Members' wishes without compromising its professionalism".

This theme reappeared in discussing the most significant change for highway engineers in recent years. "There's been this loss of professional standing compared with other (pseudo) professions and politicians" - "We're not strong enough in meeting criticism from non professionals. All the time there's this need to justify" - "With the recent loss of security we've had to sharpen our skill at justifying action". The Laboratory helps to justify that action. At the time of the study they had helped to obtain approval from Members for an

enhanced programme of major structural maintenance work. The concern of specialist groups of this nature is not so much how others influence their decision making but the acceptability of their contribution to corporate policies and objectives.

6.3.5. Interview Analysis - District Technical Staff

The five engineers interviewed from District Technical offices appeared to have most in common with Design and Construction branch staff, indeed one had worked for the County R.C.U. sub-unit until it was terminated. All had responsibility for sewerage work as well as highway engineering, and none had major involvement in the D.L.O. activities of their authority. They were in their early 40's and were chartered civil or municipal engineers. On the whole they tended to identify themselves with their authority's objectives, rather than their operational group. "You lose your objective as a pure engineer. We at District level are more prepared to reach a compromise with the views of local people" - "There's a blurred boundary between your function as a local individual and as a professional officer" - "Our objective is to meet the needs of the community and the objectives of our employers at a price which they can afford". There were echoes of comments about objectives by County Direct Works branch staff. "We aim to maintain and enhance the infrastructure of the town to its benefit and that of its residents by managing the resources allocated to us". It has value to the community because "generally the objective of the work is that of the community - it's meeting their needs". And it's value to themselves? "Well, its primarily a means of earning a living, of meeting my basic needs. But it's also a means of achieving something I can be proud of. Money isn't really a consideration". - "I feel I'm playing a key role in maintaining, and if possible enhancing, the industrial, commercial and residential life of the

Borough". - "It provides a meaning to life, a challenge, a job, and an opportunity to meet people". So achievement figures large in their job satisfaction. "It's the satisfaction of a job achieved, done well, and problems resolved". - "It's a state of contentment with your role at work. That doesn't mean it's complacency, but it's achieving all that is in hand. And having done so of course you promptly lose it, because you're aiming for the next hurdle". - "I find it in little things too - when an individual member of the public has been satisfied - in sorting out individual problems". But the political involvement was not forgotten - "job satisfaction is transporting the Members to where they want to get to in the vehicle I want them to use".

This range of factors came through in discussing the most satisfying aspect of their work just as it had in the questionnaire responses (Figure 6.15). "It's enabling people to get the job done" - "I enjoy being able to help other professionals through my knowledge and experience". - "Being able to respond effectively to a request, however small, for action, or assistance, or advice". This was to find job satisfaction in the enabling role of management and the absence of reference to the end product was noticeable. Dissatisfaction was caused by the obstruction or diversion of their department's efforts. "It's frustrating when you and your organisation are forced into a wrong, non-productive area of work". - "I get dissatisfied when professional behaviour is constrained by non-professionals: that is, by the politicians". - "The most dissatisfying aspect of my job is the decline in the status of the Borough Surveyor in relation to other Chief Officers with the growth of corporate management".

As might have been anticipated from these replies, the value of "challenge", though still highest, had a lower average ranking than for other groups of engineers interviewed. They valued "engineering

experience" as second highest and as highly as the Design and Construction branch, and "autonomy" next. "Contact with colleagues" and "professional groups" were valued equally in fourth and fifth place, while "advancement" was valued lowest, again equally with the Design and Construction branch. This simple measure reinforces the impression of similarity in the attitude of this branch's members with District officers, but their immediate objectives clearly differ.

The nature of the job in Districts was seen to have changed. "I've become less and less an engineer, and more and more an administrator". - "There's less freedom for us as engineers. We are governed by directives and rules from specialist groups who have to justify their existence". - "As a person I think my political awareness and social conscience has increased. I'm very concerned for the well-being of individuals. There's almost been a role-reversal here, with officers protecting individuals who may be harmed by the politicians' grand design". With regard to the County "there's been an increasing dependence on the Laboratory and Transportation which has brought a sort of spurious objectivity to decision making". - "There's been an increased activity by the Area Surveyor in shielding Districts from the County's experts. He's the piggy in the middle". So let us consider their perceptions of the County Department and branches in more detail. It will be recalled from Figures 6.12 and 6.13 that they have very strong links to the public (expressed to some extent in the replies recorded above) and, of the three County branches, surprisingly high frequency contacts with the Transportation branch, followed by the Design and Construction branch and the Direct Works Branch.

Both Direct Works and Design and Construction were seen as having compatible objectives to the District offices. There were differing priorities of course "maintaining the routes for through traffic rather

than local traffic and pedestrians" - "Design and Construction branch has got a more direct engineering role than we have, but I think they are marginally closer to the Districts". - "Their objective is to implement and encourage the use of the standards and criteria of the County Council". The routine relationships between the two branches and the District office appeared to be relaxed and free from tension. "Sometimes there are differences between County and District needs, and there remains some duplication, but generally we share a consensus of opinion". - "There's a difference of opinion when we are reflecting Member pressure. Then success is marked by the extent to which the County accepts the District view. Resolution of our differences is always possible where technical matters dominate. It's virtually impossible where political factors dominate".

Relations did not seem quite so relaxed with the Transportation branch. "Their objectives are preoccupied with traffic. It's an academic rather than a practical view, and it's frequently in conflict with the common-sense view of the locals". - "Their objective is blurred. They appear to take an academic, technical, economic view of the traffic system, unrelated to the fabric of the town and political factors". - "Their objectives are to achieve optimum traffic flow and safety but sometimes standards over-rule common sense". "Theirs is a self growth area. To us at District level they appear too convinced of their own importance, and it's really the tail wagging the dog". The branch is seen to have achieved greater influence over the years, and the potential for conflict between a pragmatic view of local needs and what was seen as a rather academic approach was stressed by several respondents. Where necessary problems were escalated to chief officer level, or Member level, for resolution.

The role of the Laboratory was generally welcomed. It was felt to be providing an increasing professional and practical service, with a clearer understanding of its role.

All respondents spoke of their close contact with the public, and their concern for its well being has been noted already. "They want you to resolve the problem on their door step and it's all the more pleasing when you can help them. I think they've become more demanding, more blinkered, and more individual in their pressures over the years, and more aware of the possibility of bringing pressure to bear through Members". The personal involvement and commitment of Members was recognised. "They've got to protect their own local interests and hence protect a secure political base. There can be conflict with overall District interests". - "They are trying to promote policies genuinely held, but this can be overtaken by point scoring, particularly at election time". It was universally felt that their influence had grown, and that there could be a conflict between commercial and environmental interests. Their inter-dependence with officers was noted. "You have to be aware of this loop: from Member concern to management awareness, to officers' technical proposals, to Members approval. Hence the officers' aim is to interpret Members' wishes to achieve maximum resources in pursuit of his technical activities".

Certainly the extent to which District officers felt constrained by Members was one of the most significant changes for them, as engineers, in recent years. It made it more difficult to achieve results, and agreement. If there was a difference of opinion: "Well you just have to accept the instruction from senior Members, negotiate with others, and agree to differ with the remainder. Either that, or you escalate it to the Chief Executive and Council Leader". The

declining status of engineers was also commented on "Professionals are now on tap, rather than on top. We've lost control: primarily through apathy. We've just accepted the changes and stood aloof rather than get involved. Now the expert has to justify everything he does. And all drivers consider themselves to be expert highway engineers!" - "There's far greater emphasis on accountability. That's the major change, plus, of course, technical changes like the growth in computer usage, and advanced technology".

The general impression of District engineers was that they had a wider range of objectives and values than County engineers. Hence their criticism of County experts who they considered to be "blinker" or "academic". In their concern for the fabric of their districts and for individual residents they were closely akin to Direct Works branch staff. In their attitude to their work they were more akin to Design and Construction branch staff. In their attitude to their professional activities they were more politically aware, though their perceptions of the politicians' motivation and objectives were no more objective than those held by the County organisations. Thus before completing this study in perceptions, it appears essential to consider briefly the role and goals of elected Members, and their relationship with their professional advisers.

6.3.6. Interview analysis - Elected Members

No members of the public were interviewed because it was impossible to conceive that there might be a "typical" representative. The same might be said of elected Members and initially it had not been intended to bring them into the study. They were, it will be recalled, excluded from the questionnaire circulation. However, they had figured so largely in officers' comments, and their influence was so generally

perceived to have increased over the years, that it was felt to be essential to get at least some comment from the "politicians", however small and untypical the sample. In the event four were interviewed: one, a leading Member of a District Council; one a senior County Councillor who was a past member of a highways committee; one a senior Member of a County highways committee, and one a relatively new County Councillor without highway committee involvement but a frequent correspondent on highway matters of local concern. Naturally the interview pattern had to be modified for the purpose and the general approach was to discuss officers' motivation, and work back to the individual Member's objectives and values.

The first point to note is that all thought about departments in terms of the representatives who they met. Thus they were unable to differentiate between branch objectives or style and indeed had some difficulty in suggesting what an officer's objectives might be. "Clearly there's a difference in focus between officers and Members. It's rarely a difference over objectives and ends - it's the means we tend to disagree about". - "Frequently Members have a clearer view of long term objectives, and yet they have to concern themselves with the short term, parochial matters. I suppose officers take the middle view". - "I think there's been a profound change in officers' objectives over the last 10-20 years: the pomposity has gone. Twenty years ago the first thing a new chief officer did was slap his name and qualifications over all the authority's vehicles and depots. That doesn't happen nowadays. Then I think the professionals' objective was to do his thing - build a bridge: get as much money for his patch of roads as the next officer. Now they genuinely put the interests of the authority first - it's much more a corporate effort. Mind you, as a result, I think the professionals' standing has diminished in the

public eye" - "The greatest change for them must be this pressure to greater accountability".

But where had that pressure come from? Was it part of a grand design by Members to get involved? "I think it stems from 1974. You've got to remember that in 1974 the average age of the council dropped by 20 years: primarily because of the departure of the alderman. They were the repositories of tradition and insisted that the council was run as it had been in the 1950's". - "In 1974 a new generation of councillor came in, much closer to the real world (sic.) of accountancy, management and the professions and Members wanted to be involved and became much sharper." - "Of course the financial situation emphasised the need for Member involvement and accountability - particularly after the I.M.F. involvement in - what was it? - 1977?" - "Things changed because of the new challenges we face: we now look on Principal Officers as partners". - "We have to set the image of the authority to the customers - the general public. The Council's got to be seen to be sympathetic and sensitive: not arrogant and insensitive. This has meant a change of style for some officers. They've needed this clearer framework to work within". It was not considered that officers' objectives could be divergent, or even complementary to Members'. To some Members they remained "them" - the staff without differentiation, and a rather insular staff at that.

But what of Members' objectives? "At its simplest, to get their pet things done: to keep the people happy or happier. I suppose really to be a better representative of local feeling". - "I have to represent local feeling even if I don't necessarily agree with it. Of course I try to influence that feeling as well". - "as senior Members you've the long range strategic view and the short range domestic matters. You have to strike a balance. But there's only a conflict

of interest if you're one of the decision makers". - "There's a genuine desire to make the organisation run like an efficient company". - "I'm not so fond of the idea of running the Council like a company. You can lose the objectives - lose the concept of service".

What is its value to the community? "Remember there's no one community interest. They're all individuals. I would hope that they would value having Members who make balanced decisions on their behalf - its a question of credibility" - "I hope they value a sensible view being taken on matters which concern them". - "I would like to feel that individuals and groups are satisfied with the working of the Council - of democracy". And what is its value and satisfaction to the individual Member? - "Goodness: well the achievement of some objective, however slight, gives me happiness - satisfaction". "I enjoy being part of the organisation and of seeing things happen". - "All right, for some it's an ego trip, yet they cannot be in it for power because that doesn't really lie with the executive. It's for influence, to be involved in making things work. To earn the respect of the locals and to obtain concern for local issues". - "Its value is that you are involved, yet free. Most of us have had the power - and the pressure which goes with it". - "It's a sense of fulfilment, of involvement: in making the system work. The achievement is a bonus".

The particularly satisfying aspects of the job of councillors reflected this interest in making the system work. "It's a feeling that you are influencing, not determining, events. Remember that a senior County Councillor has more influence than many an M.P.". - "I do value personal appreciation". Dissatisfaction came partly from the political system - "I object to machinations behind closed doors". "It's frustrating not being able to change majority group decisions" - "It's frustrating to have these financial restraints, not to be able to

achieve your personal hobby horse. But it's good for you not to be able to get your own way all the time. Very salutary!"

Back, in conclusion, to change over the years. "I think there's been a change in the calibre of Members. You realise that particular efforts are taken to influence the decisions of constituency committees to obtain really strong candidates - the Chairman of five years' time". "When I came I felt that the officers were scrabbling around in a bit of a fog, with no framework or strategy to be judged by or within which to judge. I hope now we're getting stability and with it greater credibility and professionalism". "Over the last ten years there's developed greater professionalism on both sides: Members and officers. There's been a levelling out on both sides. It may be perceived as a loss of professional status, but in the sense that there is more service to the common good and less autocracy I think that it's a gain in professional terms".

The overall impression of these interviews was to reinforce the concept of politicians and officers as differentiated parts of one organisation, with wide areas of objectives and values in common, yet more aware of the differences than the similarities of their roles. In practice the various roles (Chairman, local Member, chief officer, divisional surveyor, engineer), only intersect on occasions and at those times the immediate objective of the parties can be divergent, or complementary. Where there is a difference of opinion a solution is eventually found from a "meeting of minds" - a recognition of differing values and an acceptance of common values. In these circumstances there is a measure of satisfaction for all.

6.4. CONCLUSION

The interview responses reveal with unexpected clarity the differences in attitudes, perceptions, and values between the six groups represented. Considering that the majority of those interviewed were employed in a single organisation responsible for a single principal task one might have anticipated a greater diffusion of common goals and corporate concern. Clearly many of those interviewed were more concerned with their differentiated group goals than higher level, integrating, organisational goals. The expressions in Chapter 3 which were developed from Vroom's formulation of expectancy theory will assist in understanding the effect of these differences on interaction and individual action. This will be part of the process of "consolidation" in the next (final) chapter. Before this, however, it is necessary to recapitulate on the individual responses in this chapter to see what they tell us of the individuals' reactions to their changing environments in recent years.

Because it was not possible to make a comparative study over time we are dependent upon individuals' recollection of change. At the same time the differences between the branches and groups interviewed give some insight into the nature of these changes. Thirty years ago the Direct Works engineers (and to a lesser extent the District Engineers) would have been "typical" highway engineers. Although assisted by others, theirs was the principal role. Fifteen years ago the Design and Construction branch engineers would have held the dominant role and typified highway engineers in the public and politicians eyes. Today Transportation engineers are achieving a major role in policy-making and implementation and may represent the typical highway engineer of the future. Inevitably, these changes colour individuals' perceptions. The reactions of those interviewed may profitably be considered in

three groups: functional line managers (Direct Works, Design and Construction, and District engineers), support and specialist staff (Transportation and Laboratory) and the elected Members. As a focus for this review we will use the three-dimensional action space model developed in Chapter 3. The individual's personal action space will be both constrained and facilitated by his interaction with others in the organisation and its environment and by the social, technical and authority influences transmitted through his links to a multiplicity of networks.

6.4.1. Reactions of functional managers

Direct Works, Design and Construction and District engineers have related functions and their responses showed more similarities than differences. Their work is part of a continuous spectrum of constructional activity on the roads: from patching and maintaining to reconstruction and new motorway construction. Naturally the emphases of their work, and hence the "shape" of their action spaces, differ.

Direct Works branch personnel have strong interaction and identification with the public along the social dimension. The links are seen as having become more demanding and vocal over the years, the difficulty of providing an acceptable level of service as having increased. Economic factors dominate the techno-economic axis of their (work) action space - there were surprisingly few references to the techniques and activities of road maintenance. There was strong activity in the authority dimension: both in terms of "managing the system" and also in reaction to constraining authority links with "the bureaucracy". Satisfaction was derived from the service provided and from management activity. As a corollary, perceived changes related to these aspects : growing difficulty in providing services, and loss of

autonomy in managing their part of the organisation. The growing influence of the Laboratory over technical decision making was resented because it was seen to threaten their managerial autonomy and because the technical objectives of the Laboratory (and consequential priorities for the use of funds) differed from their own objective to see "their patch" in uniformly good condition. Similar considerations coloured their reaction to the Transportation branch (because of its growing influence over finance via the TPP process) and elected Members. Pressure from councillors was resented because, again, of differences in priorities: elected Members' views of the need to meet the demands of their constituents frequently differ from the maintenance engineer's views of the needs of "his" roads. However, providing his local world was not unduly disturbed, he continued to find satisfaction in his role.

This identification with an artifact is reflected in Design and Construction branch responses. There is less concern with the social and authority dimensions of their work environment. Emphasis was on the technical dimension. Authority links facilitated technical activity, and the engineers remained dependent upon physical end products for a sense of achievement, rather than on managerial activities. However, the prime centre of satisfaction had moved back from project completion to the intermediate stage of accomplishing a start on site in a number of cases and this shift in emphasis may have marked a transitional stage in the professional manager's development and job satisfaction.

Because of the complementary nature of the role of the two branches, relations with Direct Works personnel were relaxed, but there was growing tension with Transportation engineers because of their control over resources (for building cherished projects) and their

influence over design concepts. Again it was change in these influences which had direct impact on job satisfaction. Differences in objectives, differences over the use of scarce resources, and fear of the loss of autonomy were potent factors for dissatisfaction.

Relations with the public were less personal than in Direct Works branch, and there was some ambiguity in attitudes. New road works were seen to be of benefit to the travelling public, but there was frustration when that same public resisted the construction of "their" schemes. Similarly attitudes to Members were relaxed all the time they favoured a particular project, but became a source of dissatisfaction when changing political priorities made design work abortive.

It was clear that those interviewed had had a great degree of adjustment to make over recent years as they moved from an expanding road programme with considerable professional autonomy to a shrinking programme with much social and technical dependence. In spite of these changes however they did not appear to be dissatisfied. Less certain of their role perhaps, but they continued to find a sense of achievement in those projects which continued to be implemented, and in reaching compromises or "working the system" to facilitate that implementation. The shape of their action space had been modified by interaction with the public and colleagues and there had been negotiation over values at the boundaries, but satisfaction was still dominated by technical achievement, and managerial activity as a means to that end. Dissatisfaction was accordingly centred on any influences which arrested smooth progress towards the technical objective.

Neither Direct Works nor Design and Construction engineers showed any signs of concern over their links with District engineers. No doubt this was primarily due to shared objectives and an accepted

balance of power. The shape of District engineers' action spaces had much in common with that of the Direct Works engineers. There was the same emphasis on the social dimension, and concern for the needs and esteem of the general public. However in urban situations there was inevitably a more general concern for "the residents in this town" than for individual rate payers. This identification with the needs of the town meant that there was less concern with technical objectives than for Design and Construction engineers. There was similar emphasis in the authority dimension in managing the system, but more interdependence with elected Members. Job satisfaction came from this enabling role rather than from specific physical artifacts. Dissatisfaction stemmed from frustration of that enabling activity.

Perceptions of change were closely associated with these sources of satisfaction and dissatisfaction. The move from engineering roles to administrative roles was commented on and there was surprisingly strong reaction to the influence of the Transportation branch on traffic strategies and solutions in "their" districts. Although the technical justification for that branch's solution was recognised, it was seen as being in conflict with (and subordinate to) the "common sense view of the locals". It was difficult to identify what those local values actually were, but they were clearly seen to conflict with purely technical values. This reaction reflects the District engineers' emphasis on the social and authority dimensions of their action space and concern when this stability is upset by demands in the technical dimension.

Certainly there was more concern for (and apparent satisfaction from) administrative activities in Districts than in County departments, and this could mark an adjustment over the last decade made necessary by the loss of autonomy and responsibility following

reorganisation. Most of those interviewed had achieved promotion since that time and had accordingly found satisfaction in their own work even though the overall organisational action space had been radically altered by the 1972 Local Government Act. Since then individuals had come to terms with greater Member involvement, loss of decision-making freedom to the County, lower work output expectations, and increased public criticism of their work. On the whole they remained happy with their lot. There was, however, a greater sense of disillusionment at the most senior levels in the organisations, where the political pressures and experience of change were focussed.

One respondent commented that he found most satisfaction simply "in coping". Certainly the line managers interviewed from Direct Works, Design and Construction and the Districts had adapted to change - though with some sense of insecurity, and gathering frustration at their dependence on a host of "bureaucrats and experts".

6.4.2. Support and specialist staff

One might have anticipated that Transportation and Laboratory engineers would show similar attitudes and values, since both had their origin as specialist support groups some twenty years ago. Both were still regarded as such by other branches and District staff, but the Transportation branch had, in fact, achieved a significant corporate role. The Laboratory was seeking, with less success, a similar strategic role with regard to highway maintenance. Members of the two groups were acutely aware of these changes and of the overlaps with the activity of others which they imposed.

The organisational action space of Transportation engineers differed in shape and in kind from that of the functional engineers described above. There was a more abstract, even philosophical,

emphasis on objectives in all dimensions. In the social dimension there was concern for the "public good" rather than for individuals and an assurance that respondents knew what that public good was. Essentially it was expressed in economic terms, and it was this emphasis on the economic dimensions of their role which caused some conflict with the lower-level, more pragmatic objectives of the functional line managers. This economic emphasis was supported by strong authority links which enabled their influence to be exerted. Satisfaction came from intellectual, rather than physical, achievement - from the acceptance of an idea rather than from the completion of a project. Consequently dissatisfaction occurred when ideas were not accepted. Political decisions against recommended solutions were seen as "professional sell-outs". This single-minded emphasis on economic objectives distinguished the Transportation personnel. Perceptions of change concentrated on this axis. There had been a change from the purely technical, traffic modelling emphasis of the job, to the economic planning role. This had developed logically from the original "number-crunching" emphasis of training and professional activity. As a result, however, there was little emphasis on the purely social dimension of organisational activity. Perhaps in compensation there was a higher level of social activity within the branch than in other branches.

Because the branch's emphasis on economic criteria coincided so closely with central and local political objectives, the branch had the assurance of authority recognition of their quest for a part in all economic and strategic decision making in the department. Job satisfaction was accordingly high, whilst dissatisfaction stemmed from occasions when their views were ignored. One could say that their preoccupation with the techno-economic dimension had led them to seek

recognition in the authority dimension. Whilst this had brought with it a measure of conflict with other branches, it had also brought the satisfaction of both achievement and of recognition.

This had not been attained to the same extent by the Laboratory. Two dimensions of their action spaces were similar. There was little development in the social axis, and considerable emphasis on the technical dimension. Though rooted, literally, in the ground, the outcome of their work was an opinion rather than a physical product. Satisfaction came from getting ideas accepted - from achieving a "meeting of minds". However, instead of the corporate role sought by Transportation, the Laboratory seemed prepared to frame its objectives round the specialist consultancy function. Certainly there were more characteristics of a research/consultancy group in the authority network. This was relatively loose, with links outside the group dominating, rather than hierarchically within the Laboratory. This in turn contrasted with Transportation branch, where the strong thrust into the authority network of the highway department was complemented by strongly hierarchical links within the branch. There was therefore considerably less emphasis on the authority dimension in the action space of Laboratory members.

Because of their service role they were very aware of the changing emphasis in highway work - away from the period of major highway construction in which the Laboratory had grown rapidly, to greater emphasis on maintenance and protecting the status quo. Recognising this, the Laboratory has sought a major role in decision making in maintenance work. Technically they had made significant achievements, but organisationally they had not been able to match this with recognition in the authority network. As a result there was some frustration, and even insecurity, because of the readiness with which

their particular activities could be "privatised". Possibly as a result they were also more aware of the changed professional status of engineers in recent years "compared with other (pseudo) professions and politicians".

Surprisingly, therefore, the Laboratory appeared least certain of their role and future, in contrast to the surging confidence of Transportation branch. Engineers in the Laboratory continued to find satisfaction in technical recognition, but some were frustrated by the lack of authority recognition.

6.4.3. Elected Members

Clearly Members' action space will have the strongest emphasis in the social and authority dimensions. The common perception among officers was that there could be conflict between the two: between satisfying the local electorate, and achieving a position of authority in the party group. What officers perhaps failed to recognise was Members' concern for the economic dimension also. Increased recruitment of Members from the world of accountancy, management and the professions certainly brought a concomitant desire for greater involvement in the economic dimension of organisational activity.

Those Members interviewed who had long association with their authority commented on the change in the emphasis of Members' activity: first in the social dimension; then into the authority dimension, and more recently into the techno-economic dimension. In this third dimension there is, of course, potential conflict between Members' economic objectives and officers' technical objectives.

The potential conflict between social and authority objectives was commented on: but only if Members were involved in the authority

dimension - "there's only conflict if you are a decision maker". Some had found that they had had to achieve a role in the authority dimension to achieve the satisfaction all of them found in "making things work". In conversation there was little reference to political ideology - for privatisation, or against D.L.O.s. Rather the emphasis was on management of the authority in a respected, responsible and responsive manner - and "making things tick".

Perhaps the most revealing was the view that both Members and officers had become more professional and less autocratic. Also that increased corporateness by officers might have diminished their standing in the public eye. This had also been referred to by officers, but their view had been that their loss of professional standing had been due to a loss of involvement in decision making rather than a wider corporate role. For all, however, a blurring of responsibility and accountability was a source of uncertainty and dissatisfaction. The loss of autocracy noted by Members probably equates to the loss of autonomy noted by officers over the last decade. We can, perhaps, suggest that a new equilibrium between Member and officer and between Members' conflicting interests has yet to be found.

The lasting impression from the interview and the questionnaire responses, is the extent to which all of those concerned have adapted to change. Major changes in organisations and procedures have taken place over the last decade but individuals have defended a rewarding action space. Constraint in one dimension has been compensated for by added emphasis in another, and the job in hand has continued to be perceived as being a major source of satisfaction, though organisational objectives may have changed. Professional ideals of

service to the clients (however perceived) and of technical excellence and objectivity, remain little affected by changes in the authority dimension. Perhaps the professional bureaucrat retains his professional credibility and power by achieving satisfaction in the social and technical dimensions whilst seeing constraints in the third as necessary evils rather than matters of personal involvement. Certainly the concern for the public good, and for economic designs, exhibited by many of those interviewed was exercised no less freely in a bureaucratic organisation than would have been possible under commercial constraints in a Consulting Engineer's practice.

In considering individual perceptions in the light of an action space model, it has not been possible to differentiate between a person's organisational action space and his total personal action space. We conceive of his organisational action space as being within his personal action space, constrained by the organisation's social, techno-economic and authority influences. Activity in the organisational action space may assist him to find satisfaction and achievement - and realisation of some at least of his personal objectives and needs. The greater his personal identification with the organisation, the greater his commitment to organisational values and hence, one might deduce, the greater the coincidence of his organisational and personal action spaces.

All of those interviewed had, it appeared, balanced social and economic attitudes, and sought satisfaction of achievement needs (in part at least) through their organisational activity. They had negotiated their organisational action space (or role) with this objective in mind, and had reshaped that action space when it became constrained in one dimension or other by changed interaction with colleagues or others outside their organisation. One could view this

activity as aimed at maintaining a constant volume to their action space: or, more prosaically, as "coping".

CHAPTER 7

CONSOLIDATION

7.1. INTRODUCTION

This study was a consequence of the author's experiences among those responsible for highways in Kent during the decade of change from 1973 to 1983. Technical, economic, and social changes, (particularly those focussed by government legislation and directives) brought about changes in organisations, techniques and relationships. The object of the study was to seek a greater understanding of colleagues' reactions to these changes, and in particular of its effect on their decision making, autonomy, and job satisfaction. At the start of this report four stages in understanding were referred to: exploration, conceptualisation, application and consolidation. This chapter represents the fourth stage - consolidation. In it we will consider the value of the conceptualisation in Chapter 3 applied to the events and experiences reported in Chapters 4, 5 and 6. This will provide a focus for a restatement of the concepts, and a consideration of their significance in relation to motivational and organisational theory, particularly the literature on organisational change, and professionalism.

Highway engineers have a long pedigree. To set the study in context Chapter 1 gave a brief history of highways in England, of highway management in Kent, and of highway engineering as a profession. The increasing pace of change in the technical and organisational environment of highway engineers over the past decade was emphasised. Because these changes affected not only the individual engineers themselves but also their relationships with colleagues, and their employing organisation the author was hoping to find a comprehensive conceptual framework within which action and reaction at the

individual, group, and organisational levels would be comprehensible.

Chapter 2 explored other writers' explanations of individual behaviour and organisation activity, from which the concepts in Chapter 3 were developed. Writers were found to have suggested varying motives for purposive human behaviour: the satisfaction of economic needs, of social needs, of higher needs for achievement and self realisation, or of a combination of these needs. Generally, however, they did not explain how individuals decide which action to take to satisfy these varying and complex needs and objectives. Expectancy theory (and in particular Vroom's exposition) appeared to offer a rationale linking action to outcome. This was complemented by Simon's concept of means-ends chains of actions and outcomes in pursuit of high level goals.

From a consideration of individual motives and activity, Chapter 2 turned to the equally wide range of views on activity in organisations, and the means by which organisations encourage, control, and coordinate individuals' activity in pursuit of organisational objectives. Writers' perspectives ranged from a mechanical view of the individual fitting like a cog into the organisational machine, to a psychological view placing the emphasis on the needs and expectations of individual members of the organisation. From a wider viewpoint other writers stressed the need to obtain a "good fit" between the organisation itself and its environment - to achieve a degree of differentiation consistent with environmental demands. Compared with this general view, network concepts were felt to give a more specific picture of the links between a focal organisation and others in its environment, and between individuals within the organisation itself. It was noted that multiple networks could be identified, reflecting the multiple functions of the links between the nodes - be they individuals or other organisations.

Thus far, the literature reviewed in Chapter 2 presented a somewhat static picture of organisations. In closing the chapter, therefore, consideration was given to the dynamics of change - not only as something for organisational members to adapt and react to, but also as a process for them to implement. Here the literature on policy implementation was found to be relevant because the dominant influence for change for many of those considered in this study has been policy initiatives by central government. Hence the relevance of both organisational change and policy implementation theory to this study of highway engineers "implementing change".

This exploration of the literature provided a number of insights into individual behaviour and organisational activity which illuminated the author's own experiences in the arena of highway engineering over the last decade. To integrate these fragmented insights into a general understanding of those experiences demanded a more comprehensive framework.

Underlying the concepts developed in Chapter 3 to provide this framework is a picture of organisations as networks of individuals engaged in purposive activity. The networks were considered to extend both outwards to the organisation's environment and inwards to its individual members. For a comprehensive understanding of the workings of this network it was necessary to conceptualise the activity of individuals occupying the nodal points, and the manner in which they are constrained by, and in turn constrain, the total network.

Individuals were pictured as having three-dimensional action spaces bounded by their economic, social and achievement goals and values. A combination of needs theory and expectancy theory produced a cognitive model of the factors determining an individual's decisions on

action within his action space to achieve his objectives. If two people interact, their action spaces overlap. In an organisation an individual is influenced by the other members, all of whom constrain or extend his action space to some extent. The sum total of their overlapping of his action space was taken to be his organisational action space or role. The total organisation action space would be the integral of the individual organisational action spaces of its members.

When two people interact there is an exchange of resources or influence. All such exchanges could, it was postulated, be categorised as conveying social, or techno-economic, or authority resources and a person's organisational action space was taken to be bounded by his concepts of the organisation's social, techno-economic, or authority objectives. Reverting to the network model, interactions between individuals are the links in the network. The links therefore convey social, techno-economic or authority resources and there are accordingly identifiable and separate social, techno-economic, and authority networks.

Just as action in an individual's own action space was taken to be a means to the end of achieving his personal objectives, so action in this organisational action space was taken to be determined by his assessment of the best means of achieving organisational objectives, whilst at the same time having regard for his own personal objectives. In reaction with another, his decisions would be influenced by the incentives or penalties held by the other.

Like its individual members, the organisation action space would be constrained by authority, techno-economic, and social influences in its environment - by the links to it in the inter-organisational

network. Individual members of the organisation would have technical and social networks extending out into the organisation's environment. The boundaries of an organisation are therefore imprecise in practice. Though clear cut for the authority network, they are blurred for the technical network, and are diffuse for the social network.

The perspective taken throughout Chapter 3 was very much a "bottom up" view of organisations. It is the actions and reactions of individuals which are the basic elements upon which wider organisational concepts are built. This gives an action approach rather than a systems frame of references to the study. Within each action space:-

"Action occurs not as a response to an observable stimulus but as a product of what Parsons (1951) has called a 'system of expectations' arising out of the actor's past experiences and defining his perception of the probable reaction of others to his act. At the level of cognition, the actor defines his situation in this way and becomes aware of alternative courses of possible action. Since action is goal orientated, that is concerned with the attainment of certain subjectively-perceived ends, the actor chooses, from among the means of which he is aware, the action that seems most likely to produce what he would regard as a satisfactory outcome" (Silverman 1970, p.130).

Concepts of organisations as networks of individuals in purposive activity of this nature underlie the comprehensive framework developed in Chapter 3. It was used in subsequent chapters to categorise events and structures, and explain activity and reactions. Perhaps, then, it is more than a framework? Ryan maintains that "conceptual frameworks are either theories whose authors are afraid to assert them like men or

else a wasted labour; a more adequately validated supply of causal generalisations would inevitably generate the vocabulary necessary to their adequate formulation" (Ryan 1970, p. 97). The test must be the value of the "causal generalisations" of Chapter 3 for the understanding of actual events. It was particularly interesting to see whether decisions are, in practice, as objective and "optimized" as the concepts would imply.

Yet organisations are more than merely the summation of their individual members. They have cultures, status systems, and traditions which are inherited and passed on by each generation of members. The social network gives some expression to these factors, but a simple integration of individual members can never represent the full complexity of these "larger scale phenomena". In so far as they are the results, rather than the causes, of individual perceptions, this does not invalidate the model. A more significant influence on organisational characteristics may be exerted by the environment. In Chapter 4 various concepts of the environment were explored in relation to the complexity, variability and liberality of inter-organisational networks and the uncertainty of their members. These considerations enabled the changing environment of highway engineers over the last decade to be analysed. The major influence of central government in the authority network was noted. The resultant impact upon organisational action space along the authority dimension was seen to be complemented by more gradual adjustments along the other two dimensions due to individual members' perceptions of economic, technical, and social change.

Chapter 5 moved on to a study of the organisational changes which ensued during the past decade. Again differentiation between three categories of change (authority, techno-economic, and social) on the

differentiated groups within the organisations. In relating these changes more directly to the environmental influences recorded in Chapter 4 a particular process of change was isolated. This involved a characteristic reticulist activity by individuals in the network who translated change transmitted to them through the links in one category of network into expansionist activity in another. This occurred both when change was transmitted to the organisation through significant external links (generally in the authority network) and also when change was initiated from within the organisation by members responding to external pressures.

Chapter 6 was a report of individual action and reaction in the highway authority network in Kent. It opened with an analysis of the links in the inter- and intra-organisational network of those engaged on highway activities in the County. Authority, information, advice, and social links were recorded, together with their frequency and direction. This analysis would provide a source of data for a detailed morphological or interactional analysis of the network. For the present purposes a simple analysis was sufficient to show that there was a clear distinction between the authority and technical (information and advice) networks, whilst the social network was hardly significant. Interactions with specific focal persons were analysed with particular reference to the degree of openness of the groups in which they were employed, and their independence of or interdependence with other specialised groups.

Having examined environmental changes (in Chapter 4), organisational network changes (in Chapter 5) and network link frequencies and functions (in opening Chapter 6), it was possible to set the reactions and perceptions of individual occupants of the nodes in context.

The major part of Chapter 6 was a report of individual responses to questions regarding their objectives, and sources of job satisfaction, their perceptions of the values and objectives of those with whom they came in contact at work, and their experience of change over the last decade. Because interdependent activity is the essence of organisational life it was felt to be essential to obtain a picture of mutual perceptions of the node occupants at both ends of links in the network(s) and also of tension or adjustments in those links arising from changes in recent years. Chapter 6 closed with a summary of these reactions interpreted in the light of the action space model, with particular regard to the dominant dimensions which typify the work action space of the six groups of individuals who were interviewed.

To the writer, the closing summary in Chapter 6 and the deductions and categorisations in the previous two chapters certainly aid an understanding of what has happened in the world of highway engineering in Kent since 1972. The triple-network model not only formed the basis of an inventory of change events, but also brought clarity to the multiplicity of relationships occurring within the highway organisations. The action space concept, at organisational and individual level, provided a figurative representation of the objectives of the participants, and the influences constraining their activity. But if we are to understand why people have reacted as they have to change, and why relations have, as a result, been modified we must as it were get inside the "black box" operationalist concept of action spaces and explore the individuals cognition in these changing circumstances on the basis of the adaptations of Vroom's expectancy theory developed in Chapter 3. Following the sequence in that chapter we will wish to consider the actions of individuals alone, individuals in relationship with another, and individuals in organisations. Rather

than the abstract considerations of Chapter 3, however, we will now use those concepts to explain the responses reported in Chapter 6. We will also wish to set our understanding of those responses within the context of professionalism.

7.2. INDIVIDUAL MOTIVATION

During this investigation an effort has been made to obtain a clearer impression of what people meant by job satisfaction and a sense of achievement. It was felt that this should be particularly relevant to the motivation and reactions of a group of professionals who have, in the past, been reported to have high achievement needs (see for instance Gerstl and Hutton 1966). Before considering the responses in the light of our three dimensional cognitive model we should, perhaps, compare our findings with those of other researchers in this field.

Two pieces of research into job satisfaction and professional values have been referred to earlier: that of Herzberg (1972) and of Perrucci and Gerstl (1969). Both dealt with engineers. It will be recalled from Chapter 2 that Herzberg found that, for his respondents, the factors causing satisfaction were separate and distinct from the factors causing dissatisfaction, and concluded that the two factors were not simply opposites of each other. "The opposite of job satisfaction is not job dissatisfaction, but rather no job satisfaction, and similarly the opposite of job dissatisfaction is not job satisfaction but no job dissatisfaction" (Herzberg 1972, p. 113). Herzberg asked his respondents what event in their work had "made them feel good" - led to extreme satisfaction - and what event had caused extreme dissatisfaction on their part. His results have been criticised (for instance by King 1970) because individuals might dissociate themselves subconsciously from events causing

dissatisfaction, and link this instead with events in their environment - the typical dissatisfaction with management, pay, and colleagues found by Herzberg. This was borne in mind in the present investigation. By avoiding reference to "events" in the questionnaire and merely asking "what has given you the most dissatisfaction and frustration at work since 1974?" it was hoped to generalise the question somewhat and encourage more abstract replies. The replies summarised in Figure 6.15 were re-categorised under similar headings to those used by Herzberg. The results are shown in Figure 7.1. Figure 7.2 is a plot of the results. It has similar characteristics to Herzberg's results. They fall readily into two groups, those factors which are intrinsic to the job itself, causing job satisfaction and those which are extrinsic to the job, causing job dissatisfaction. However, Herzberg's hypothesis that the former "growth" factors cannot cause job dissatisfaction, and that the two are on separate continua is not necessarily justified. It is clear that failure to achieve end results or failure to win recognition can cause a professional dissatisfaction, though the failure may be blamed on others. If job satisfaction is the resultant of needs satisfaction in three dimensions then change in any one of the three axes can cause a change in resultant satisfaction. There is interdependence between the axes because the majority of the causes of dissatisfaction grouped along the organisational authority axis inhibit attainment and hence satisfaction along the individual achievement axis.

The dominant contribution of achievement to the job satisfaction of all respondents is illustrated in Figure 7.1, with little variation across the specialist groups involved. Work content is obviously associated with this aspect of individuals' satisfaction with their jobs. Dissatisfaction primarily stems from organisational constraints

Reported By ► Reported Source of Satisfaction or Dissatisfn.	Group (B) Direct Works				Group (C) Design & Const ⁿ				Group (D) Transportation				Group (12) Laboratory				Group (E) District Staff.				All Respondents			
	+	%	-	%	+	%	-	%	+	%	-	%	+	%	-	%	+	%	-	%	+	%	-	%
Achievement	9	36	-	-	16	32	3	6	3	30	-	-	3	25	-	-	15	34	-	-	46	33	3	2
Recognition	-	-	-	-	1	2	2	4	1	10	1	10	1	8	-	-	-	-	1	2	3	2	4	3
Work Content	3	12	-	-	7	14	3	6	1	10	-	-	1	8	-	-	4	9	-	-	16	11	3	2
Responsibility	1	4	1	4	1	2	1	2	-	-	-	-	-	-	-	-	4	9	-	-	6	4	2	1
Advancement	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	8	-	-	-	-	-	-	1	1
Growth	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Organisational Constraints	-	-	10	40	-	-	13	26	-	-	3	30	-	-	2	17	1	2	18	40	1	1	46	33
Management	-	-	-	-	-	-	-	-	-	-	1	10	-	-	1	8	-	-	-	-	-	-	2	1
Work Conditions	-	-	-	-	-	-	1	2	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1	
Status or Salary	-	-	1	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	4	-	-	3	2
Colleagues	-	-	-	-	-	-	-	-	-	-	-	-	1	8	-	-	-	-	-	-	1	1	-	-
Security	-	-	-	-	-	-	2	4	-	-	-	-	-	-	2	17	-	-	-	-	-	-	4	3
Totals.	n = 25				n = 50				n = 10				n = 12				n = 45				n = 142			

FIG 7-1 REPORTED SOURCES OF SATISFACTION (+) AND DISSATISFACTION (-) GROUPED UNDER
HERZBERG'S CATEGORIES

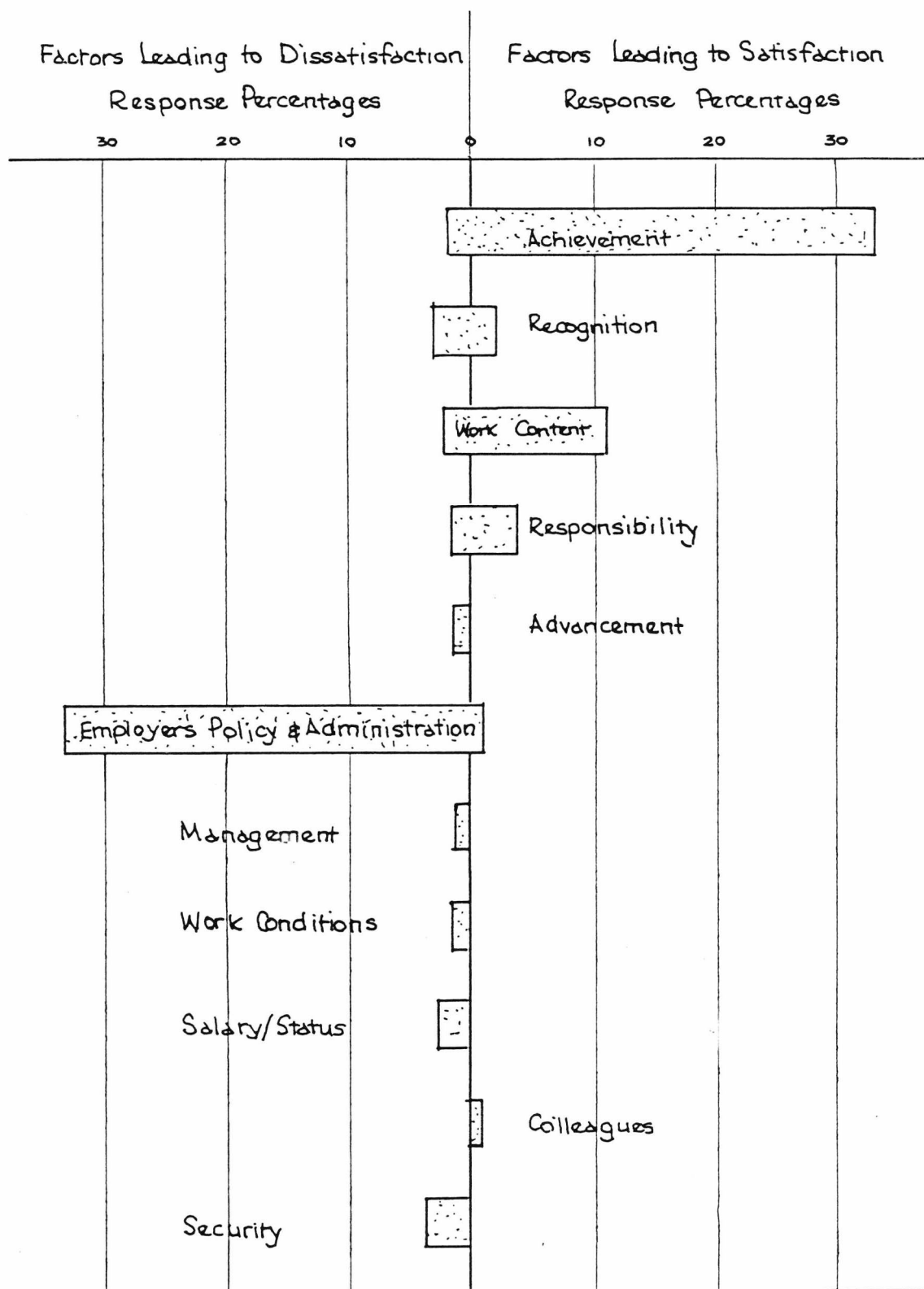


FIG 7-2 REPORTED SOURCES OF SATISFACTION AND OF
DISSATISFACTION

which may be anticipated to inhibit or deflect the individual in pursuit of his goal.

Professional values were explored more fully by Perrucci and Gerstl (1969) and their work was replicated in simplified form during personal interviews for this study. Six work attributes were referred to, and the individuals were asked to rank the six in order of value to them. The individual results have been referred to in Chapter 6, and are summarised in Figure 7.3. If we consider the three sets of goals (social, economic, and achievement) which were proposed in Chapter 3 (section 3.2.1.) as setting the framework to individual decision making, then "challenge" and "autonomy" values must be reflected in the achievement axis. If "engineering experience" builds up a sense of competence then it too must lie along that axis. "Opportunities for advancement" may primarily relate to the economic axis, though as a measure of professional attainment they could influence the achievement axis. Finally "contact with colleagues" and "professional contacts" must primarily influence the social axis.

The preoccupation of these engineers with achievement needs at work is plainly illustrated by these results. Social needs have little consequence and are presumably met generally in the course of work or more specifically outside the working environment. Economic needs too are apparently satisfied in view of the lack of interest in advancement. Individual branches differ in their professional values. The Direct Works branch places higher value on autonomy than other branches, while the Design and Construction branch places the highest value on achievement. The younger engineers in the specialist Transportation branch and Laboratory show the greatest concern with advancement, while District personnel have the lowest valuation of achievement and the highest for social contacts.

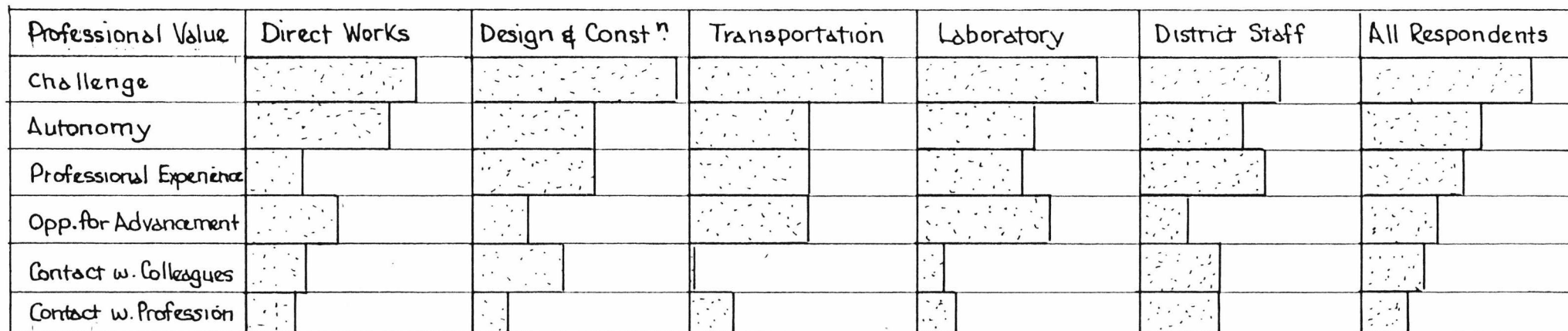


FIG 7-3 RANKING OF PROFESSIONAL VALUES BY RESPONDENTS - Length of bar indicates relative importance

The three dimensional concept of needs and goals assists understanding at the individual level in three ways. First it enables an individual's values to be categorised along three axes and the most significant identified. Second, differences in the reported sources of job satisfaction can be explained by the differing intensity of needs of various individuals along these three dimensions and hence the differing orientation of their resultant goal. We are led to expect that a person will perceive his job as giving him satisfaction to the extent that his actions at work facilitate achievement of that resultant goal. Thirdly, the model can explain the apparent realignment of objectives of individuals when satisfaction along one need dimension was constrained, to minimise the impact on their resultant goal vector.

Moving on from the three dimensional model of needs to the associated concept of three dimensional action space, we have seen already (in Chapter 6) how this enables us to describe different respondents in terms of the relative shape of their action spaces. It will be recalled from Chapter 3 that the cognitive theory related decisions on means-ends activity within that action space to values and instrumentalities. Thus the force to take a particular action was considered to be proportional to the product of the relative value of the ends to be achieved and the instrumentality of the action for achieving those ends. This helps to explain the loss of job satisfaction suffered by respondents when their perceptions of the instrumentality of their activity for goal achievement changes. Thus having to share responsibility for a scheme might reduce its perceived instrumentality for achievement needs satisfaction if the individual concerned valued autonomy highly.

But the comments on job satisfaction also call for a clarification of the three dimensional model. The level of objectives referred to by respondents was relatively low: "completing the job in hand" or, at a higher but more abstract level, "intellectual challenge". Rather than reaching to abstract "self actualisation" goals, individuals seemed content with a modest level of practical attainment, and stimulation. Indeed, individuals showed more concern to maintain a given level of social, economic, and achievement needs satisfaction (subject to adjustment over time) than to strive after higher objectives. They were frustrated by interruptions to the steady progress of "their" project; not by potential damage to the organisation's higher goals. Managers expressed satisfaction in the smooth running of the organisational machine, and in coping rather than achieving: in satisficing rather than in optimising. This calls for some reconsideration of the needs satisfaction model of individual motivation developed (after Maslow and Alderfer) in Chapter 3.

The behaviour reported by respondents may be taken to reflect a "consistency" model of personality rather than our "fulfilment" model. McClelland (1961) postulated that individuals endeavour to minimise large discrepancies between expectation and actual occurrences (to avoid a threat) while maximising small discrepancies (to avoid boredom). This would be compatible with respondents relatively modest, low level goals, rather than uncertain ultimate goals. Fiske and Maddi (1961) are concerned with levels of activation and stimulus rather than expectancy. They suggest that individuals attempt to maintain a level of activation to which they are accustomed. Both of these views would equate with engineers adjusting their aspirations (and hence the boundaries of their action spaces) to ensure a consistent level of challenge, and achievement. This would explain the dissatisfaction

reported when new-found dependence on others reduced rates of output. It would also suggest why many of those interviewed had adjusted readily to change in organisational objectives, providing their personal activities had not been unduly affected.

The professional's desire for a consistent level of achievement rather than for some form of ultimate goal also explains the results summarised in Figures 7.1 and 7.2. Extrinsic factors at work inhibit the desired level of achievement, and cause dissatisfaction. Satisfaction stems from maintaining, or enhancing, that level of achievement. Perhaps it is part of the professional's psychological make-up that he rarely admits that extrinsic factors assist him to maintain his preferred level of achievement (and hence satisfaction), or that his own failures are the cause of a reduced level of achievement (and hence dissatisfaction). The degree to which extrinsic, environmental factors can inhibit his satisfaction will depend on the extent to which he is dependent on that environment for resources. Those resources are transmitted to him through links with others - links which we have characterised as having social, techno/economic and authority contents.

7.3. INDIVIDUALS INTERACTING WITH OTHERS

In Chapter 3 it was suggested that one person could influence another's decision making in four ways. First, he could increase the second person's expectancy that a desired outcome would follow one particular action rather than another. Secondly, he could increase the instrumentality of the other's action for the achievement of desired outcomes. Thirdly, he could, probably over a longer time span, change the other's valuation of various outcomes. Finally he could offer an incentive to increase the benefits accruing to the other from making

the decision or taking the action the first desires. In the organisational context the concept of "incentive" should, perhaps, be broadened to include any resource desired or needed by the other person. (These four forms of influence emphasise differing factors in Expression 5 of Chapter 3).

In the light of the comments in section 7.2 above, we would now suggest that the individual will be concerned to maintain a consistent level of economic, social and achievement needs satisfaction rather than to seek to reach more abstract goals. He will react all the more strongly if that level is disturbed. The incentive provided or disturbance caused by another actor need not only be of a financial nature. We have previously considered the transmission of other resources, including authority (i.e. commands requiring compliance), social support and information. If one person in an organisation is dependent on another for a resource of this nature he may have to accept a less satisfactory action or outcome than that which he would prefer in order to safeguard the acquisition of the essential resource, or the maintenance of a consistent level of goal satisfaction.

We would take this to be the explanation for maintenance engineers loss of satisfaction when their increasing dependence on a particular resource (the Laboratory's technical information) led them to adopt a programme of major maintenance, rather than their preferred local patching activity, losing social recognition in the process. We would say that the major maintenance work was less instrumental for the realisation of their social needs than the local patching work. Similarly the loss of satisfaction by design engineers when adopting a lower standard of highway design, in order to obtain the needed resource of an authorised and adequate priority rating from their colleagues in the Transportation branch, would be explained by the

lesser instrumentality of an inferior design for realisation of their need for achievement, and the value which they place on maintaining their habitual level of needs satisfaction.

Dependence of one individual on a particular resource held by another is an indication of a power differential between the two. However, it is not a direct measure of that differential. As Rhodes (1981) indicated in his analysis of inter-organisational relationships, a number of factors determine the relationship between loss of discretion and the degree of dependence on another for a resource. He postulated that the discretion of one organisation is influenced by the goals, decisions and relative power potential of the other. In turn, the relative power potential is a product of the participants' resources, the rules of the game and the process of exchange (or bargaining) between them. Finally the process of exchange is influenced by the resources of the participants, their strategies, personalities and the number of units.

In individual relationships the "rules of the game" and process of bargaining between two individuals will dictate how much the discretion of one is actually constrained by his dependence on a resource held by another. Thus one may avoid taking an action instructed by another having authority over him by the strategy of appealing to a higher and potentially more sympathetic, authority. The designers' dependence on Transportation branch approvals was modified by extending discussions in an attempt to "wear down the opposition", escalating the problem to senior officers, and acceptance of minor modifications in order to safeguard the major concepts.

We have seen, therefore, how our cognitive theory of action can help to explain how one individual loses job satisfaction if his

dependence on another for a resource makes him accept an action which is, to him, less highly valued than another. At the same time we have seen that the resultant power of the second individual is modified by the personality and strategies of the first. The cognitive expression of the factors influencing choice developed in Chapter 3 will serve as a framework for analysis of the expectancies, instrumentalities, and values affecting specific events, though it may tend to suggest that these are more determined than may be the case.

We must next consider how these relationships are modified when organisational values are involved.

7.4. INDIVIDUALS IN THE ORGANISATIONAL NETWORK

We have seen how individuals' actions may be considered to lie along the resultant of their economic, social and achievement needs, how dissatisfaction is caused by constraint on that resultant, but how a less satisfying action may still be adopted if a valued (or indispensable) resource is acquired in the process. During their working day, people seek to maintain an acceptable level of activity and satisfaction in their organisational environment. Many of their actions will not influence their personal values, but will be dictated by their perceptions of organisational values or objectives. In Chapter 3, Expression 6, it was suggested that an individual's preferred action in an organisation would be dependent on the value of maintaining his own economic, social and achievement goals, his perceptions of the techno-economic, social and authority objectives of his work, and the perceived instrumentalities of his action for their achievement. Thus both personal and organisational values enter into decision making, though for many actions one or other set of values may not be influential (i.e. the action may have an instrumentality of zero for that set of values).

The changes in the balance of power between groups in the organisation which we have noted in this study resulted in some groups having to modify their work activity, reducing either the value of that work in their eyes for achieving organisational objectives, or their perception of the instrumentality of that work for achieving those objectives.

We have seen that individuals generally had a clear cut impression of the objectives and values of their branch or group activity: Direct Works maintaining the fabric of the highway and relations with the public; Design and Construction implementing schemes to enhance the highway network; Transportation ensuring that resources are spent effectively to the maximum benefit of the travelling public; the Laboratory providing a consultancy service in geotechnics, materials and highway assessment; District offices endeavouring to meet the needs of their particular communities; and elected Members representing local feeling and ensuring that their authority runs efficiently. But it was apparent in discussions that group objectives and values were not necessarily seen in the same light by other groups. Clearly this was a potential cause of conflict when one group had to accept another's values in reaching a decision, because the other group had a necessary resource.

Figure 7.4 gives an indication of the similarity of one branch's view of the other's objective and its own view. Where there are differences it is frequently because branches "down grade" others' objectives. Thus Direct Works tends to look upon Transportation and the Laboratory as purveyors of information rather than as participants in corporate decisions, and they doubt elected Members' altruism. Design and Construction branch has a similar view of the Transportation branch and its members stress the elected Members' political ambitions. The

Note: (✓) Indicates that groups below have similar view of objectives of groups across to those they hold themselves. (x) the reverse						
	Direct Works	Design & Construction	Transportation	Laboratory	District Staff	Elected Members
Direct Works	/	✓	x	x	✓	x
Design & Construction	✓	/	x	✓	✓	x
Transportation	x	x	/	✓	x	✓
Laboratory	✓	✓	✓	/	-	-
District Staff	✓	✓	x	x	/	✓

FIG 7-4 PERCEPTIONS OF OTHERS' OBJECTIVES

Laboratory has a relaxed and realistic view of the objectives of their colleagues while the Transportation branch endow the majority of the those with whom they come into contact with low-level goals - "mending potholes and fire fighting" - "building bigger and better roads" - "looking after their patch". Different groups operate at different levels of abstraction.

If all groups were autonomous these misconceptions of others' goals would not be important. However, the effect of change over the last decade has been to make groups interdependent, and hence increase the difficulty of reaching a decision because the values of others have to be respected or accepted. If those perceptions of the values of others are incorrect it will obviously be more difficult to accept their advice. Alternatively it may not be accepted by one group that another's objectives are legitimate (the lack of support in other branches for Transportation branch's view that they are the ultimate arbiter of the best use of resources has already been referred to).

The effect, then, of change over the last decade has been to increase interdependence, and as a result, negotiation over the organisational values and instrumentalities formulated in Chapter 3 (Expression 6). Because functional groups have become dependent on specialist groups for resources of information, advice, authority, and financial approval, they have had to accept compromise over values and instrumentalities in their work. Because they seek personal satisfaction at work these adjustments in organisational factors influence their own satisfaction - positively for the specialist when his ideas are accepted, negatively for the functional engineer when a scheme he regards as sub-standard is implemented - and the reverse. Again the range of factors in the cognitive expressions in Chapter 3 can act as a framework for analysis.

We have seen, however, that groups may adopt strategies or redefine objectives in order to mitigate this loss of autonomy: seeking information from elsewhere; bypassing accepted procedures; appealing to higher authority; or even challenging the legitimacy of another group's role. We have seen the dissatisfaction of the Direct Works branch with the Laboratory's endeavour to give advice as well as information on maintenance matters, and the Districts' dissatisfaction with the Transportation branch's academic approach to what they deem as "practical problems of local significance". Because the Laboratory's role in maintenance matters had not been defined with authority, the Direct Works branch could, at the time of the interviews, still accept the information but not the advice. The District engineers were bound to accept the Transportation branch's advice because they were dependent upon County approval of their schemes. They would, however, on occasions try to minimise this sanction by the strategy of direct appeal to their own Members. Personalities are clearly of paramount importance in this process of exchange. Mutual respect for each other's values facilitates agreement.

Because of the professional's concern with achievement, there is bound to be overlap between his personal goals and organisational processes and objectives. He seeks professional achievement through the technical resources which the organisation provides. Perhaps the most significant overlap is between the individual's and the organisation's social objectives. It is along this dimension that the bureaucratic professional must justify his claim to a true service orientation. Certainly responses from individuals showed a considerable concern with social considerations. "The public good" figures prominently in their replies while, at a more personal level, there was appreciation of and concern for people's personal problems.

To this extent it was a mistake to confine questionnaire responses to social contacts within the organisation. Clearly there is a strong social network out to the general public - whether as individuals or as a client group. The Direct Works branch was concerned in particular about individuals: Transportation about the "general public" per se.

This merging of the individual with the corporate social objective, and the valence of professional activity for both the achievement goals of the individual and the techno/economic goals of the organisation would simplify the cognitive expressions in Chapter 3 (Expressions 5 and 6) in practice.

The perceived values of organisational objectives set bounds to the individual's work action space, and these individual elements of action space are integrated into the total organisational action space. This in turn is bounded by organisational objectives and values. So individual perceptions of organisational goals must contribute to the establishment of overall organisational goals. We can visualise the low level goals of "internal" members of the organisation serving as premises to the decisions of those higher in the hierarchy and at the boundary of the organisation. Hence it is these "external" members who determine the formally recognised organisational goals.

The influence of the external environment is to change the shape of the organisational action space, and hence the balance within the inter-authority network. The networks transmit resources. In the process of change these resources have become available to new elements of the network. The cost of a resource to an individual who is dependent upon its supply by the authority network is a sharing in decision making in the technical network, particularly regarding instrumentalities. Similarly the cost of a resource of information for

activity in the technical network may be a loss of autonomy in the authority network. This must be the mechanism by which the network changes noted in Chapter 5 have been carried out. Change in one network has been transformed into change in another as a result of bargaining over resources (resources which are network specific) values and instrumentalities and this must be seen as being a significant reticulist activity of individuals during this period of change.

In addition to their organisational environment the individuals who are the subject of this study share a professional environment - part technical, and part authoritarian. We must, therefore, consider whether this investigation throws fresh light on the attitudes and activities of the professionals and the structure of professionalism.

7.5. INDIVIDUALS AND PROFESSIONALISM

Writers on professionalism would appear to have concentrated on three aspects. First they have considered the characteristics and attributes of professionals and professionalism (see for example Etzioni 1969, Larson 1977, Gerstl and Hutton 1966, Perruci and Gerstl 1969, and Harries Jenkins 1970). Second, they have examined the role of professionals within bureaucratic and service organisations (for example, Hill 1972, Schott 1978, Blau and Scott 1963, Healey and Underwood 1978). Finally they have considered the activities of professionals in the inter-organisational network (for example, Laffin 1980, Dunleavy 1980).

Johnson (1972) criticises those who list the characteristics and attributes of professions without an adequate theoretical framework to determine their relevance and significance. The action space model would appear to provide such a framework. We may differentiate between the professional's own private action space, his professional

action space, and his organisational action space. The values setting bounds to his private action space are the product of his personality, upbringing, education, and socialisation. We have seen that he will have strongly developed achievement goals. He chooses a profession which he anticipates will "fit his action space". In fact the chosen profession provides a professional action space for him - delineated by the social, technical, and authority values of the profession. These values embody (respectively) the service orientation, high degree of systematic knowledge, and control of behaviour through codes of ethics which writers such as Barber (1963) identify as the essential 'traits' of professions. The professional action space constrains and facilitates realisation of his private goals which determine his private action space. He accepts the professional constraints in exchange for the protection, facilities, and credibility it provides for his professional activities. It is public recognition of his profession which safeguards his professional autonomy. Autonomy, in this sense, is the ability to determine his own professional solution to his clients' needs.

But few professional engineers are self-employed. Most work in organisations or in partnerships. Organisations provide an organisational action space for individual employees. Just as an individual's professional action space can constrain and facilitate his private action space, so his organisational action space can constrain and facilitate his professional action space. Healey and Underwood (1978) describe how planners have sought to modify their organisational action space to safeguard their status, and professional action space. Similar negotiation between professional groups has been reported in this study. Blau and Scott (1963) examine the potential conflict between professionalisation and bureaucratisation - between the

professional and organisational action spaces - and conclude that this conflict is not inevitable. One may facilitate the other: in particular, professionals may find satisfaction of achievement needs through an ascent of the authority network of the organisation, rather than from purely technical activity. This is a cause of concern to Schott (1978): "the injection of engineers into the commanding heights of these organisations continues, justifiably, to give pause". His concern stems from engineers' apparently poorly developed appreciations and values in the social dimension. "Given what appear to be rather clear sets of characteristics of engineers and the lack of a social ethic among them, their impact on the social and human dimension of government activity is quite possibly a negative one" (p. 131). We have seen in this study that in fact senior managers have developed considerable awareness of the social goals of their organisation, while the evaluative and pragmatic aspects of their craft find expression in managerial activities. It is rare for a professional in public or private practice to be engaged in purely technical activities. Managing the activities of others to produce a common end product becomes an increasing element of his task as experience increases. Engineering is a corporate activity.

So it would appear that the "professional bureaucrat" can find satisfaction in both his professional and his organisational action spaces - depending upon the extent to which one constrains or facilitates the other. His profession gives him credibility in the technical network; his organisation gives him power and responsibility in the authority network. With seniority he regains a measure of autonomy. He also becomes involved in policy decisions by (in the case of local government) elected Members. Hill (1972) explores the respective roles of politicians and administrators - and emphasises

that the "boundary" between the two is not fixed. It depends on the nature of the decisions to be taken. Our action space concept is of assistance here. Decisions along the technical dimension will generally be based on professional officers' advice. Decisions along the social dimension will generally be considered to be "political" matters. (It will be recalled that one District Officer drew attention to something of a role reversal here, when officers appear to have more concern for the impact of policy decisions on private individuals than political Members). There is, therefore, differing responsibility for policy-making in the technical and social networks and a measure of bargaining between officers and Members when both technical and social values are involved.

Extending the network analogy out into the organisation's environment clarifies professional officers' roles in central-local relationships. Laffin (1980) describes how "local government professionals also occupy strategically placed positions within local government, central government, and organisations between the two levels of government" (p. 22), thereby achieving considerable influence over policy making. He views relationships in this inter-organisational network as being power-dependent, with professionals endeavouring to maintain and enlarge the acceptance by others of their claims to expertise in certain areas of social concern. This may be an overstatement of the role of local government engineers. Certainly they are active in the inter-organisation technical network. At the time of writing a local government engineer is President of the Institution of Civil Engineers, and County Surveyors' Society representatives act as advisors to the ACC and AMA - on technical matters. Their advice is rarely sought on social matters, but they have some influence in the authority dimension - in direct contact with the Department of

Transport. Dunleavy (1980) appears to take a more sanguine view of this activity of local government professionals on the national stage, accepting that "the national local government system is the one important context in which professionals can publicly break out of the cultural cliché that they only administer politically-determined policies and move into an overt policy-making role" (p. 118). Certainly senior officers may find a source of achievement and satisfaction in this arena, albeit, in the case of engineers, principally in the technical dimension. Nor should the social dimension of this form of activity be forgotten.

In conclusion we must, like Barber (1963), reiterate that there is no absolute difference between professional and other kinds of occupational behaviour. There are relative differences - which could be analysed as differences in the dimensions of the relevant occupational action spaces. The particular constraints on professionals in bureaucratic organisations could be pictured as the interaction of professional and organisational action spaces. The changing role of professionals in local authorities and in their environments can be pictured as resulting from renegotiation of their positions and influence in the inter- and intra-organisation technical, authority, and social networks.

7.6. CONCLUSION

This has been a wide study. In seeking an understanding of highway engineers' experiences in a decade of change we could have concentrated on one specific event and traced its impact through the network of those engaged in highway activities in the light of the concepts developed in Chapter 3. Certainly this would have been preferable for a quantitative study, and the information obtained by

questionnaire and interview could support such an investigation at a later date. The difficulty would be to isolate the "figure" of the specific event from the "ground" of changing environments, techniques, and organisations recorded in Chapters 4 and 5. Clearly people react to a number of influences acting on them in an organisation, and that reaction is coloured by their perception of the values and status of those through whom the influences are transmitted.

Whilst it has, then, been an advantage to take a general view of the impact of change on a particular group of highway engineers in recent years it has, as a result, not been possible to avoid generalisation in reporting individual reactions.

The object was to seek greater understanding of these engineers' reaction to change, and of its impact on their relationships with others. In doing so an action perspective was employed, and concepts were developed to "explain" and categorise action and reaction at a number of "planes of focus" from the individual to the inter-organisational level. But concepts are personal: one man's model is another man's muddle! In the process of abstraction (for generalisation and conceptualisation) it is all too easy for two individuals to be at different levels, so that what is meaningful to one is meaningless to the other. One of the advantages of a general study is that some at least of the concepts developed may have more general interest. Let us then recapitulate the concepts. They were that:-

1. Individuals' actions are motivated by social, economic and achievement needs which may be conceived as lying in three orthogonal dimensions.

2. Three dimensional needs produce a resultant goal which an individual endeavours to achieve and thereafter maintain at a consistent level.
3. The individual seeks to use the resources of the environment in which he finds himself to achieve his resultant goal. He does so by a portfolio of means-ends activity lying along that resultant.
4. He selects actions to achieve outcomes which he perceives as being means towards higher order ends on the basis of a cognitive assessment of the value to him of the ends and the instrumentality of the means for the realisation of those ends.
5. His personal values may be conceived as lying in three dimensions corresponding to his needs. These three dimensional values or objectives set bounds to his action space within which actions for achievement of his resultant goal must lie.
6. Resources are transmitted through his links with others. They may be social, technical, economic, or authority resources and links, and each will impose its own form of rationality on action.
7. Interaction with another results in a transmission of resources which may facilitate or constrain an individual's goal achievement and maintenance (and hence satisfaction). Interaction implies an intersection of two individual's action spaces.

8. An organisation has social, techno-economic and authority objectives, established at its inception, and maintained or modified by its members in reaction with its environment.
9. Members of the organisation interact with each other in identifiable social, techno-economic, and authority networks, transmitting corresponding resources.
10. The total overlap of individual members' action spaces from interaction with the triple intra-organisational networks delineates his organisational action space or role. The three dimensional axes of organisational objectives will generally be skewed to his personal goals.
11. The organisation's action space is a function of the summation of the organisational action spaces of its members and the configuration of the network. It is constrained by social, tecno-economic and authority influences in its environment.
12. In an organisation, preferred individual action will be determined by its perceived value and instrumentality for the achievement of personal and organisational goals.
13. Job satisfaction will depend upon the extent to which activity at work facilitates the maintenance of a consistent level of personal goal achievement. Change, affecting the shape of an individual's work action space, may therefore affect job satisfaction.
14. External pressures transmitted through one intra-organisational network are translated by those affected into reticulist activity in another network as they seek to maintain the volume of their action space. Similar reactions stem from their own

perceptions of change in the organisations environment.

15. Inter-organisational influences are transmitted to organisations through triple inter-organisational networks. These will be structured to reflect the variability, complexity, and liberality of the environment.
16. At the boundary of organisations there will be differentiation among organisation members to reduce the perceived uncertainty of the inter-organisational network for individual decision makers.
17. Organisational members have a measure of strategic choice to minimise the impact of inter-organisational influences on organisational action space and discretion.

These propositions may, perhaps with justice, be considered to provide a comprehensive framework. First they have provided a framework for categorising events and interactions. This is an essential first stage to understanding. They have enabled an inventory of change events, and changed organisational structures to be prepared bringing order to a multiplicity of interdependent developments.

Second they have provided a number of complementary explanations of individual actions. No single view will suffice because people themselves have varying mental models of the world they report and respond to. For the writer, "solid" concepts of action space and three dimensional goals have meaning because they express the interdependence of differing needs and values. The pictures of the professional they provide, with a clear shape to his action space, and clearly developed needs in the achievement dimension, aids understanding of the impact which interaction with others has on his satisfaction.

For this is the third value of the concepts - their emphasis on interaction as well as action. Change in the last decade has brought about new relationships, and power or dependence within those links. It is no surprise that individuals noticed those aspects of change most which influenced their job satisfaction to the greatest extent. Accommodating to change meant reorientating their goals to maintain a consistent level of satisfaction. Surprisingly few of those interviewed had failed to make that adjustment. Multiple concepts can cater for this individual flexibility. But can they also be said to advance the motivational and organisational theory from which they were developed?

Radically new concepts are not presented. Rather the intention has been to integrate fragmented concepts within a more comprehensive framework. Thus at the individual level an attempt was made to link needs theory and expectancy theory to give a model of individuals' decision making when selecting courses of action for goal achievement. This gave greater analytical precision to Simon's (1976) concept of means-ends chains of action and outcome.

The suggestion that individuals' needs (and consequential goals) might be pictured as lying in three orthogonal dimensions is an innovation. It provides a three dimensional model of the manner in which people might achieve a balance of needs and determine their goals. This in turn gives a fresh and more specific meaning to action space concepts. These concepts could be used analytically to compare the shapes of various individuals' action spaces. The three dimensional model also offers an opportunity to integrate the action frame of reference into a rather more structured view of the constraints on individual activity.

Network concepts provide a means of depicting the integration of the individual into his employing organisation. The model of multiple (social, techno-economic and authority) networks obviates sterile debate about "formal" (i.e. authority) and "informal" (i.e. social) structures. The multiple social system concepts of Burns (1966) and the multiple rationality concepts of Hartwig (1978) are compatible with a multi-dimensional view of organisations. Simon's rational man, and Argyris's self actualising man would then be viewed as two dimensions of a single organisational role (Simon 1973; Argyris 1973). Furthermore the concept of organisation action space as the integral of individual employees' work action space offers an opportunity to clarify the approach to organisational goals and values.

Extending networks out into the organisational environment brings structural clarity to contingency theory. The segmentalisation of organisation environment, and associated differentiation of organisational structure observed by Lawrence and Lorsch (1969) may be pictured as a number of specialised networks extending outwards to an organisation's environment and inwards to its specialised groups. The contingent link between environment and structure then becomes an expression of interdependence in the network links.

The approach developed in this study has been found to be of value in the consideration of organisations and their members in a time of change. In view of the rate of change in many commercial and administrative organisations in the last decade it is perhaps surprising that the literature on organisational change is not more extensive. Writings are fragmented and descriptive rather than analytic. Johns (1973) however, takes a more general view of the sociological consequences of change. This is a step towards the comprehensive view sought by the author which would follow the process

of change through the inter- and intra- organisational network, consider the resources released or modified by the change and the impact on the action spaces of the occupants of the node points. In the case of these individuals who are located at the focal point of change, the research has in fact brought about some adjustment to the concepts developed in Chapter 3. These suggested that individuals take a very calculative, objective view of decision making, adopting the optimum action for the realisation of personal and organisational goals. The research indicates that people in fact take a more pragmatic view: satisficing rather than maximising. We have seen that they appear to seek and maintain a level of equilibrium in their organisational role, with a consistent level of goal achievement (in the social, economic and achievement dimensions) rather than seeking ultimate fulfilment in this respect.

This in turn has significance for the process of change, and explains in part why the majority of those interviewed appeared to have coped well with the considerable degree of change they had experienced. Traditional line managers continued to find satisfaction in activity with relatively low level goals, whilst specialist support staff, with clearer views of higher objectives, were finding satisfaction in the gradual expansion of their group's role and influence.

It has not been possible to generalise about the reactions of professionals in a time of change. Rather, professionals have been pictured as particular individuals under particular authority and technical constraints. They remain a widely varied group - all, admittedly, concerned with achievement; all with a specialised and technical knowledge, but otherwise defying categorisation. It is the interplay of their personal, professional and organisational objectives and action spaces which stimulates interest, rather than the

sociological generalities of their occupational traits. Clearly there is not a typical professional: each of the specialist groups within the profession revealed differences in attitudes and objectives.

For the future, a more detailed investigation of the manner in which individuals establish "consistent" bounds to their personal, professional and organisational action spaces would appear to be a more promising line of research. The (goal oriented) action space model requires further elucidation to incorporate the wealth of insight in psychologists' concepts of individuals' (value oriented) assumptive worlds (Young 1977). If, as some writers suggest, assumptive worlds are hierarchically organised (from opinions at a low level to ideologies at the highest level) there may be a link to hierarchies of goals in means-ends chains of actions, particularly in the dimension of achievement goals.

Those interviewed in this research had been surprisingly successful in maintaining a satisfactory "volume" to their action spaces, and hence in coping with organisational change. This heartening professional resilience remains the lasting impression from this study. It originated as an attempt to understand individuals' experience of change in a relatively specialised and homogeneous group of organisations. In so far as it has enabled a clearer picture of the actions and reactions of those individuals to be obtained, it has succeeded thus far. It is hoped that the concepts developed, consolidated in part in the light of specific responses, may be of more general utility in setting a framework for the study of individuals in changing environments.

APPENDIX
RESEARCH METHODOLOGY

A.1. NETWORK ANALYSIS

To explore the interactions between those engaged in highway activities in Kent, a questionnaire was circulated to 80 engineers in County, District, and Department of Transport offices. The object was to determine the shape of the inter- and intra-organisational networks of highway engineers, and the frequency and function of the links between them. It was also intended to obtain some indication of perceptions of change and job satisfaction.

A.1.1. Questionnaire format

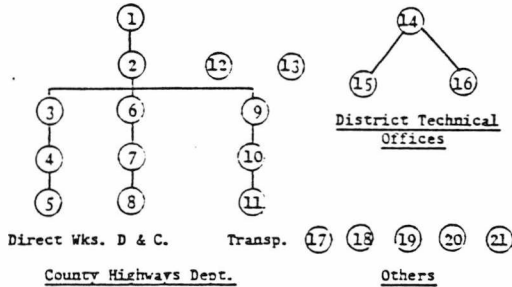
The proforma adopted, after a trial run, is shown in Figure A.1. It will be seen that it consists of five elements:

- i) a diagram of the network showing 21 nodes - individuals or groups engaged in highway activities - 13 in the County highways department, 3 in Districts, and the remainder in other parts of the "environment"
- ii) an identification of the respondent's location in the network
- iii) a report of the frequency of his contacts with the 21 nodes in the network identified by purpose and direction
- iv) a report of the effects of these contacts on his job satisfaction
- v) a report on the factors (other than personal contacts) perceived as resulting in change, job satisfaction, and job dissatisfaction.

UNIVERSITY OF KENT AT CANTERBURY - RESEARCH PROJECT

I hope you will feel able to assist my research into the functioning of the network of individuals and groups involved in highway work in the County by completing this questionnaire, and returning it by

1. The network. I show below a number of groups and individuals with whom you may have contact.



Key:-

- | | |
|--|---|
| 1. County Surveyor | 15. District Design Staffs |
| 2. Deputy C.S. | 16. District Works Staffs |
| 3,6,9. Branch Heads | 17. Other County Depts. |
| 4,7,10. Group heads and Area Surveyors | 18. DTp. |
| 5,8,11. Sections and Divisions | 19. Elected Members |
| 12. Highways Laboratory | 20. General public |
| 13. Finance Branch | 21. Local professional institution meetings |
| 14. District Technical Officers | |

2. Which is your position or group? Please insert key number from above:-

3. What are your CONTACTS at work? Please indicate those individuals and groups with whom you have personal or telephone contact by crossing their key numbers in the boxes below:-

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
---	---	---	---	---	---	---	---	---	----	----	----	----	----	----	----	----	----	----	----	----

4. What is the PURPOSE and FREQUENCY of your contact? Please indicate under each of your contacts' key numbers the FREQUENCY by D (each day) W (each week) M (monthly) Y (yearly) against those PURPOSES shown to the left which are relevant. Please include your own group.

- a) For direction or command (Give which you:- Receive)
- b) For data or information (Give which you:- Receive)
- c) For advice or help (Give which you:- Receive)
- d) For purely social purposes (eating together, playing squash etc)

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21

5. What is the EFFECT, if any, of these contacts on your job satisfaction? Please indicate I (job satisfaction increased by contact) N (not affected) or L (covered).

- a) Effect of contacts for command
- b) Effect of contacts for information
- c) Effect of contacts for help
- d) Effect of contacts for social purposes

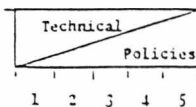
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21

6. Since 1974 we have experienced a time of change at work due to various economic, political, organisational and technical factors. What change has affected you most significantly?

7. What has given you most dissatisfaction and frustration at work since 1974?

8. What has given you most satisfaction and sense of achievement at work since 1974?

9. To what extent does your job satisfaction arise from the technical content of your work or from helping to achieve the policies and objectives of your authority? Please ring your position on the 5 point scale:-



Thank you for your help.

John Baggott

FIG A-1 REDUCED COPY OF QUESTIONNAIRE FORM (GENERAL CIRCULATION)

Inevitably the 21 node network is a considerable simplification of the actual relationships, but it was felt to reflect in skeleton the principal vertical and horizontal differentiation in the county highway organisation and the other significant groups and organisations in its environment. A prime consideration was to ensure that the nodes would be readily identified by respondents. In practice respondents had no difficulty identifying their own location in the network shown on the proforma.

In identifying purposes of links to the 21 nodes which would reflect the authority, technical, and social dimensions of the study it was necessary to use phrases which were relevant to the actual organisation concerned. Thus "direction" and "command" were used to describe the purpose of authority links; "data" and "information" for technical links, and specific activities ("eating together, playing squash, etc.") for the social link. Because of the differing degrees of personal commitment, the factual activity of providing data and information was identified separately from the value judgements inherent in "advice" and "help".

Frequencies were to be indicated by D (each day), W (each week), M (monthly) and Y (yearly). This was sufficiently specific for most respondents, though some added Q (each quarter) "as a more realistic indicator".

Direction of the link was to be indicated by providing separate lines for "giving" or "receiving" the command, or data, or advice, but it was assumed that social links would be balanced, and no indication of direction was requested.

An attempt was then made to invite a response indicating the effect of these links on job satisfaction - whether it was increased,

not affected, or lowered. In retrospect it appears to have been a mistake to seek reactions of this nature by questionnaire. The link between job satisfaction and interaction was not sufficiently apparent to respondents to make this section of the questionnaire of value. Sections 6, 7, 8, and 9 of the questionnaire were more readily appreciated by respondents, covering change in the working environment, of satisfaction and dissatisfaction at work.

In case it became necessary to examine interaction within a particular group, a modified proforma (Figure A.2) was distributed to all members of a single section in the Design and Construction branch. Because of the greater number of nodes within the section, other nodes in the network were grouped to avoid an increase in the total number of nodes.

A.1.2. Questionnaire distribution

80 questionnaires were distributed to a wide sample of managers from Section Engineers (the most junior line managers) to Departmental heads, together with all members of a single design team. Other than the single design team, circulation was limited to managers because the majority of interactions with representatives of other branches, departments, or authorities took place at this level. As a consequence a high density sample could be obtained. 50% of District managers and 70% of County managers were in fact sent copies of the questionnaire.

Responses were not sought from higher number/low involvement groups such as other County departments, and the general public because of the impossibility of obtaining a typical response. Department of Transport respondents were selected from the small group in the regional office at Guildford concerned with trunk roads in Kent.

UNIVERSITY OF KENT AT CANTERBURY - RESEARCH PROJECT

I hope you will feel able to assist my research into the functioning of the network of individuals and groups involved in highway work in the County by completing this questionnaire, and returning it by

1. The Network. I show below some of the groups and individuals with whom you may have contact.

1

2

3

4

5

6

7

8

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12

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14

15

16

17

18

19

20

21

District Technical Offices

County Highways Department

Others

Key:-

1. County Surveyor

2. Deputy County Surveyor

3. Transportation Branch

4. Direct Works Branch

5. P.A.C.S. (D & C)

6. S.G.E. West Kent

7. Section Engineer

8. 2 Deputy S.E.) S.W.

9. 8 Engineers) Kent

10. 2 Technicians) Section

11. Other D & C Sections

12. Highways Laboratory

13. Finance Branch

14. District Technical Office

15. District Design Staff

16. District Work Staff

17. General Public

18. DTP.

19. Elected Members

20. Contractors

21. Local Professional Institution Meetings

2. Which is your position or group? Please insert key number from above:-

3. What are your CONTACTS at work? Please indicate those individuals and groups with whom you have personal or telephone contact by crossing their key numbers in the boxes below:-

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21

4. What is the PURPOSE and FREQUENCY of your contact? Please indicate under each of your contacts' key numbers the FREQUENCY by D (each day) W (each week) M (monthly) Y (yearly) against those PURPOSES shown to the left which are relevant. Please include your own group.

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21

a) For direction or command (Give which you:- Receive)

b) For data or information (Give which you:- Receive)

c) For advice or help (Give which you:- Receive)

d) For purely social purposes (eating together, playing squash etc)

5. What is the EFFECT, if any, of these contacts on your job satisfaction? Please indicate I (job satisfaction increased by contact) N (not affected) or L (covered).

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21

a) Effect of contacts for command

b) Effect of contacts for information

c) Effect of contacts for help

d) Effect of contacts for social purposes

6. Since 1974 we have experienced a time of change at work due to various economic, political, organisational and technical factors. What change has affected you most significantly?

7. What has given you most dissatisfaction and frustration at work since 1974?

8. What has given you most satisfaction and sense of achievement at work since 1974?

9. To what extent does your job satisfaction arise from the technical content of your work or from helping to achieve the policies and objectives of your authority? Please ring your position on the 5 point scale:-

Technical Policies

1 2 3 4 5

Thank you for your help.

John Burgess

FIG A-2 REDUCED COPY OF QUESTIONNAIRE FORM (SPECIAL CIRCULATION)

- 344 -

Of the 80 proforma distributed, 75 were returned as shown below:-

<u>Node Key No.</u>	<u>Post/Activity</u>	<u>Questionnaires Issued</u>	<u>Responses Received</u>
1	County Surveyor	1	1
2	Deputy County Surveyor	1	1
3, 6, 9	County Highways Branch Heads	3	2
4, 7, 10	County Highways Group Heads	13	13
5, 8, 11	County Highways Section Heads	19	18
12	County Highways Laboratory	3	3
13	County Highways Accountants	2	1
14	District Technical Officers	7	7
15	District Design Staff	7	6
16	District Works Staff	7	6
17	Other County Departments	-	-
18	Department of Transport	2	2
19	Elected Members	-	-
20	General Public	-	-
21	Local Professional Institutions	-	-
8 etc. modified	Single Design Team	15	15
		--	--
		80	75
		--	--

A.1.3. Questionnaire Analysis

Responses to Sections 3 and 4 of the questionnaire (covering direction, function and frequency of links) were uniformly good. With hindsight it can be seen that the phraseology of 4a was somewhat ambiguous. While it had been intended to pick up the authority links of the command structure the words "direction" and "command" were obviously taken by some respondents to include formal procedural links for issuing instructions or requests across branch or organisation boundaries - thus blurring the response.

To analyse the responses, frequencies were converted from "daily, weekly, monthly, yearly" to events per year. Thus, assuming some 240 working days a year and 48 working weeks:-

D (each day)	=	240 times a year
W (each week)	=	48 times a year
M (monthly)	=	12 times a year
Y (yearly)	=	1 time a year.

In this way frequencies for a group could be made additive. Responses from representatives of a group were averaged to give a typical response for a group member and multiplied by the total number in the group to give the total result for the node. Schmidt and Kochan (1977) found that averaged scores from respondents of a similar nature showed no significant difference with non-averaged scores on the dimensions examined and it would not be possible to handle the responses in a simple manner without grouping and averaging the responses in this way.

Results from the questionnaire shown in Figure A.1 were recorded on 21 x 21 adjacency matrices, with separate sheets for command, advice, information, and social interaction (Figs. A.3 - A.6). Double entries were obtained in many cases from respondents in both nodes of a link. Thus in Fig. A.5 (Information) node 6 (Branch head, Design and Construction branch) reported a frequency of 240 (daily) in giving information to node 8 (Section heads in the same branch), whilst the average of the responses from node 8 indicated the frequency of receiving information from node 6 (shown in brackets in the same box) as 170.

		TO																				
FROM	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	
	1		240 (48)	240 (13)	48 (8)	12 (12)	240 (37)	48 (4)	12 (240)	48 (126)	12 (10)	12 (25)	48 (48)	12 (26)								12
	2		N (48)	O (24)		R (32)	E (84)	P (7)	L	Y (126)	(10)	(24)	(36)									
	3			48 (384)	48 (144)			(17)					(36)	(4)	(24)							
	4			48 (288)	768 (848)		12 (102)			48	48	252 (12)	240 (144)	12 (12)	49 (146)	72	252	12				
	5				720 (16)			(138)		(72)		(1)	(144)		(96)	16	16				360	
	6			12 (24)			48 (432)	240 (272)				12 (12)	12	12 (28)	12 (100)							
	7			(12)	12			1008 (240)	(2074)			12 (12)	12 (9)		12 (24)	1	300		(48)			
	8			17 (1)	137 (32)		68	1156 (408)	1	1	17	108	170 (9)		119 (24)	34	393	17				
	9	(240)	N (13)	O		R	E	P (1)	L	Y (894)	(2400)		(9)	(4)	(2)							
	10			(48)	72			(18)		1080 (2400)			(9)	20	(24)		360		72			
	11			(48)				(34)					(9)	480	480 (24)							
	12			12 (24)			12	12			12	720 (288)	(9)		(24)	(2)		(12)				
	13				36 (240)	(32)	9	9 (85)		9	24	9	720 (720)				9					
	14	24 (2)		2	(12)	(16)	2					(12)			2112 (696)	2040 (1656)			646	480	48	
	15				(1)							(12)			1440 (480)	1632 (960)	4			480		
	16				(12)							12			96 (292)	1440 (272)						
	17		N (240)	O (16)		R	E (48)	P (409)	L	Y			(9)		(4)							
	18	(12)	24	(252)	(64)	96 (1)	48 (60)	12 (103)	24	(19)		2 (72)		(480)	(96)			240 (240)		12		
	19	(48)	N (48)	O		R (12)	E	P	L	Y (36)	(120)					(24)		(312)				
	20		N (240)	O		R	E	P	L	Y					(480)							
	21		L (12)	O		R	E	P	L	Y					(2)			(48)				

Note: Figures in brackets are recipients' report of frequency -

FIG A-3 COMMUNICATION BETWEEN IDENTIFIED NODES
FOR COMMANDS

TO																					
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
1		240	240	48 (13)	12 (1)	240 (12)	48 (1)	12 (1)	240	48 (18)	12	48 (12)	12	(30)				12	48		
2	(240)		N (12)	O (49)		R (12)	E (12)	P (2)	L	Y (36)				(52)							
3	(240)	12		48 (348)	48 (128)	12 (48)	(2)		12	1		12 (1)	48 (9)	1 (30)	(1)			1 (120)	12	12	
4	(48)		252 (48)	528 (540)	960 (736)	12 (12)	60 (300)	97 (511)	12	60 (18)	72	252 (61)	336 (144)	60 (28)	253 (122)	84 (28)	312	72 (24)	96	528	
5	(12)	2	80 (12)	1040 (492)	1056 (465)	4	20 (45)	209 (445)		32 (18)	208	353 (253)	400 (144)	17 (2)	320 (98)	352	675	65 (26)	352	1408	2
6	12 (240)	12	48 (48)	12 (24)	(3)		48 (752)	240 (188)	48	48 (18)	12	12 (1)	(9)	48 (76)	48 (24)		48	12 (24)	48	48	
7	13 (48)	24	14	312 (64)	62 (19)	96 (48)	896 (384)	960 (462)	13	36 (90)	13 (120)	1	24 (9)	25 (2)	73 (72)	2 (28)	312	97 (960)	13	24	12
8	(12)	2		528 (61)	462 (209)	120 (480)	680 (952)	2	127 (162)	205 (480)	93 (254)	85 (36)	18 (2)	445 (26)	34	698	137 (96)	35	680		
9	(240)		N (1)	O (12)	(1)	R (48)	E (14)	P (2)	L	Y (576)	(120)	(1)	(3)	(28)	(24)			(480)			
10	(48)	18		36 (1)	20 (60)	18 (33)	108 (48)	162 (60)	454 (161)	360 (360)	1440 (120)	20 (12)	72 (9)	108 (4)	450 (48)	(28)	306	36	108	162	
11	(12)			(96)	(208)	(12)	120 (109)	480 (221)	2400 (1080)			120 (12)	(36)	480 (2)	480 (1)	480		(120)		2400	
12	48 (12)	72	1	72 (12)	253 (276)	13 (355)	72 (12)	72 (48)	1	60 (18)	60	720 (720)	(36)	25 (2)	108 (120)	13 (14)	300	108 (84)	13	60	2
13	(48)		9 (48)	144 (312)	144 (385)	9 (48)	9 (153)	36 (3)	9 (75)	36	36 (12)	720 (720)				9	144	3 (36)	36		
14	28 (12)	26	4	2 (60)	2 (17)	54	2 (26)	2 (18)	26	2 (36)	2 (480)			96 (96)	1656 (528)	1200 (2020)	24		1368	738	48
15			2	122 (1)	98	24	72 (60)	26 (52)	24	24 (378)	2 (480)	48 (72)		600 (1632)	960 (960)	720 (1358)	28	2	960	2486	
16				28 (24)	(337)		28 (17)		28			(12)	(9)	1148 (1104)	924 (624)	840 (680)	28		102	2020	
17			N (2)	O (312)	417 (417)	R (48)	E (324)	P (649)	L	Y (336)	(480)	(6)	(144)	(50)	(28)	(86)		(36)			
18	(12)		120 (60)	24 (65)		480 (109)	96 (139)	960	960 (54)	120 (108)	60 (3)	24 (4)	96 (2)		592			(24)		120	
19	(48)		N (320)	O (48)		R (48)	E	P	L	Y (120)				(336)	(96)	(25)					
20			N (400)	O		R (12)	E (136)	P	L	Y (48)	(36)			(576)	(1212)						
21			N (12)	O		R (12)	E (24)	P (18)	L	Y (120)				(50)	(2)						

Note : Figures in brackets are recipients' report of frequency

FIG A-4 COMMUNICATION BETWEEN IDENTIFIED NODES
FOR ADVISE

TO																					
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
1		240	240	48	12	240	48	12	240	48	12	12	48	12				12	48		
2	(240)		N O			R E P	L Y					(72)		(52)		(28)					
3	48	240		48	12	12			12	1		12	1					12	48	48	
4	72	72	576	384	768	24	84	61	24	84	72	300	540	60	253	84	312	264	96	336	12
5	16	24	192	1152	800	8	16	192		32	112	400	464	16	320	352	448	320	400	1344	
6	48	48	48	12	12		48	240	48	48	12	12	48	48	48		48	12	48	48	
7	48	96	2	312	73	596	396	928	15	48	85	37	48	14	61	2	552	132	63	276	
8	6	7	35	682	664	187	2129	1255	5	181	519	127	340	24	476	51	800	157	115	1266	
9	(240)		N O			R E P	L Y					(12)	(3)	(34)	(192)	(24)					
10	126	126	2	54	144	93	126	234	1152	360	1440	38	92	72	234		755	54	126	234	57
11	10	10				120	120	480	2400	2400		120		480	480		480		480	2400	
12	61	144	24	60	285	36	72	300	12	96	108	720	288	25	108	13	306	108	12	60	2
13	48		36	144	144	36	9	9	9	36	36	36	720								
14	194	28	54	52	4	52	28	2	8	4	4	2	2	120	2208	1680	30	2	1368	1176	24
15			24	264	96	132	120	60	192	50	48	24		672	960	972	52	2	792	2400	
16		28	28	112	28	28	56	28	28	56	24			1648	615	1680	84		228	1520	
17			N O			R E P	L Y														
18	(12)			60	12	12	12	12		2								48		2	
19	(48)		N O			R E P	L Y														
20			N O			R E P	L Y														
21			N O			R E P	L Y														

Note : Figures in brackets are recipients' report of frequency.

FIG A-5 COMMUNICATION BETWEEN IDENTIFIED NODES
FOR INFORMATION

		TO																				
FROM		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
	1			(1)			(1)		(1)				(1)		(30)							
	2			N (1)	O (1)		R (1)	E (1)	P (1)	L	Y		(1)		(4)							
	3	1	1		1 (64)	1 (67)	1 (1)	(1)	(1)				(1)		1 (2)							1
	4		1	64 (1)	132 (132)	84 (144)			12 (1)		(18)				(2)	3 (24)		63			60	6
	5			67 (1)	144 (84)	448 (448)		64	32 (1)				64 (48)					80		1		19
	6	1	1	1 (1)				1	(1)	1			(1)		1 (2)							1
	7		1	1		(64)	(1)	12 (12)	300 (429)		(108)	12				(24)					240	
	8	1	1	1	1 (12)	1 (32)	1	429 (300)	436 (436)	2	68 (90)	68	1 (48)	1	1			1				
	9			N (1)	O		R (1)	E	P (2)	L	Y (36)	(120)	(1)		(2)							
	10				18			108	90 (68)	36	360 (360)	810	18 (1)		72	72 (24)		360			360	18
	11							(12)	(68)	120 (810)												
	12	1	1	1		48 (64)	1		49 (1)	1	1 (18)		60 (60)					48				12
	13								(1)													
	14	30	4	2 (1)	2		2 (1)		(1)	2	(72)				30 (30)	104	102 (36)		2	30	120	30
	15				24 (3)			24			24 (72)				(104)	2 (2)	26 (602)	26				
	16														36 (102)	602 (26)	602 (602)					
	17			N (63)	O (80)		R	E	P (1)	L	Y (360)		(48)			(26)						
	18														(2)							
	19			N (1)	O		R	E	P	L	Y				(30)							
	20			N (60)	O		R (240)	E	P	L	Y (360)				(120)							
	21			N (1)	O (6)	(19)	R (1)	E	P	L	Y (18)		(12)		(30)							

Note : Figures in brackets are recipients' report of frequency

FIG A-6 COMMUNICATION BETWEEN IDENTIFIED NODES
FOR SOCIALISATION

In order to show the relationship between groups diagrammatically it was necessary to amalgamate the information into significant blocks, to give 11 x 11 matrices (Figs. A.7 - A.10). The significant, clearly differentiated, groups were considered to be:-

A	Nodes 1, 2	:	County Surveyor and Deputy
B	Nodes 3, 4, 5	:	Direct Works Branch
C	Nodes 6, 7, 8	:	Design and Construction Branch
D	Nodes 9, 10, 11	:	Transportation Branch
E	Nodes 14, 15, 16	:	District Technical Officers
F	Nodes 12, 13	:	County Laboratory and Accounts.

The remaining five nodes, with whom these groups communicated were included individually, since they already represent significant groups.

To represent the network diagrammatically the grouped nodes were plotted round the periphery of an oval. Every link could then be shown as a chord between two points on the periphery without overlapping other links. One diagram was plotted for each of the four functions (command, advice, information, social) and the frequency of interaction was shown by varying the number of lines making up the link. Links within the grouped nodes were shown in the same way. Dual entries in cells in the matrix were averaged, and total frequencies (irrespective of direction - i.e. A to B plus B to A) were determined. The results were illustrated in Figures 6.2 - 6.5 of Chapter 6.

Whilst these four diagrams illustrate the diversity of links in the network of relationships in highway organisations, they are too complex to show particular characteristics. To assist in doing so, the seven most frequently used links were identified on the command and information networks (equivalent to the authority and technical networks respectively) and the results are illustrated in Figures 6.6

		TO										
FROM		A	B	C	D	F	E	17	18	19	20	21
	A	X	384 (173)	391 (144)	436 (272)	120 (133)	12 (26)	-	-	-	-	12
	B		X	12 (287)	96 (72)	492 (337)	149 (282)	268	12	-	360	-
	C	-	178 (69)	For Links Within Group Nodes See Fig A-3	19	328 (42)	190 (176)	693	17 (48)	-	-	-
	D	(240)	85 (109)	1 (53)	X	9 (27)	990 (54)	360	-	72	-	-
	F	-	48 (512)	42 (85)	45	X	(26)	9 (12)	-	-	-	
	E	24 (12)	2 (4)	2	-	12 (24)	X	4	-	646	960	48
	17	-	40 (256)	REPLY (457)	-	(9)	(4)	X	-	-	-	-
	18	(12)	24 (316)	156 (164)	24 (19)	2 (72)	(556)	240 (240)	X	-	12	-
	19	(48)	40 (48)	REPLY (12)	(156)	-	(24)	-	(312)	X	-	-
	20	-	40 (240)	REPLY	-	-	(480)	-	-	-	X	-
	21	-	40 (12)	REPLY	-	-	(2)	-	(48)	-	-	X

Note: Figures in brackets are recipients' report of frequency

FIG A - 7 COMMUNICATION BETWEEN GROUPED NODES

FOR COMMANDS

For Plot See Fig 6-2

		TO										
	A	B	C	D	F	E	17	18	19	20	21	
FROM	A	X	349 (76)	326 (39)	336 (294)	132 (84)	52 (82)	-	12	48	-	-
	B	14 (324)	X	414 (1317)	397 (60)	695 (612)	1087 (309)	987 (170)	128	460	1948	2
	C	63 (338)	1438 (424)	For Links Within Group Nodes See Fig A-4	504 (727)	215 (369)	693 (230)	1058 (280)	236	96	752	12
	D	258 (318)	70 (412)	958 (675)	X	216 (73)	1570 (135)	876	516 (168)	108	2562	-
	F	120 (132)	623 (1308)	211 (391)	169 (97)	X	155 (136)	444	111 (120)	13	96	2
	E	54 (38)	258 (439)	208 (173)	108 (1428)	48 (93)	X	80	2	2430	5304	48
	17	-	N O (731)	R E P (1021)	L Y (976)	(204)	(164)	X	(36)	-	-	-
	18	(12)	144 (125)	576 (260)	2040 (1014)	84 (211)	192 (6)	592	X	-	120	-
	19	(48)	N O (320)	R E P (48)	L Y (120)	-	(457)	-	-	X	-	-
	20	-	N O (400)	R E P (148)	L Y -	(84)	(1788)	-	-	-	X	-
	21	-	N O (12)	R E P (54)	L Y (120)	-	(52)	-	-	-	-	X

Note: Figures in brackets are recipients' report of frequency.

FIG A - 8 COMMUNICATION BETWEEN GROUPED NODES
 FOR ADVICE For Plot See Fig 6-3

		TO											
FROM		A	B	C	D	F	E	17	18	19	20	21	
	A	X	432 (193)	376 (139)	300 (240)	132 (96)	92 (272)	-	12	48	-	-	
	B	472 (636)	X	397 (1688)	337 (255)	1716 (563)	1086 (522)	760	596 (24)	544	1728	12	
	C	253 (451)	1840 (329)	X	961 (1197)	612 (390)	724 (536)	1400	301 (72)	226	1590	-	
	D	512 (436)	255 (452)	1241 (969)	For Links Within Group Nodes See Fig A-5		267 (129)	1516 (426)	1235	54	606	2634	37
	F	205 (204)	693 (2464)	462 (656)	257 (149)	X	246 (56)	306	108 (12)	12	60	2	
	E	28 (28)	662 (781)	506 (730)	414 (1535)	28 (31)	X	166	4	2388	5096	24	
	17	-	N O (796)	R E P (1342)	L Y (1234)	(204)	(190)	X	-	-	-	-	
18	(12)	(584)	84 (271)	12 (76)	2 (117)	(6)	X	-	-	2	-		
19	(48)	N O (336)	R E P (75)	L Y (92)	-	(1152)	-	-	X	-	-		
20	-	N O (656)	R E P (945)	L Y (120)	-	(3752)	-	-	-	X	-		
21	-	N O (86)	R E P (159)	L Y (158)	(13)	(297)	-	-	-	-	X		

Note: Figures in brackets are recipients' report of frequency

FIG A - 9 COMMUNICATION BETWEEN GROUPED NODES

FOR INFORMATION

For Plot See Fig 6-4

		TO										
FROM		A	B	C	D	F	E	17	18	19	20	21
	A		2 (3)	3 (5)	-	1 (2)	4 (34)	-	-	-	-	-
	B	3 (2)		169 (5)	1 (15)	64 (49)	4 (28)	143	-	1	60	26
	C	5 (3)	5 (109)		151 (201)	2 (49)	2 (26)	1	-	-	240	1
	D	-	19 (1)	201 (151)	For Links Within Group Nodes See Fig A-6	19 (2)	146 (26)	360	-	-	360	18
	F	2 (1)	49 (64)	50 (2)		2 (19)		-	48	-	-	-
	E	34 (4)	28 (4)	26 (2)	26 (146)	-		26	2	30	120	30
	17	-	N O (143)	R E P (1)	L Y (360)	(48)	(26)		-	-	-	-
	18	-	-	-	-	-	(2)	-		-	-	-
	19	-	N O (1)	R E P -	L Y -	-	(30)	-	-		-	-
	20	-	N O (60)	R E P (240)	L Y (360)	-	(120)	-	-	-		-
	21	-	N O (26)	R E P (1)	L Y (18)	(12)	(30)	-	-	-	-	

Note : Figures in brackets are recipients' report of frequency

FIG A - 10 COMMUNICATION BETWEEN GROUPED NODES

FOR SOCIALISATION

For Plot See Fig 6-5

and 6.7 of Chapter 6. The differences are sufficiently striking to confirm that the authority, technical and (by virtue of the sparsity of links) social networks are substantially different from each other.

To examine individual perceptions, average responses were calculated from the questionnaire replies for five key (groups of) individuals. These were identified on the questionnaires by the key numbers 4, 7, 10, 12 and 15 (i.e. fourth tier officers in Direct Works, Design and Construction and Transportation branches and the Highways Laboratory in the County, and the Senior Design engineer in District Technical Offices). These were selected as being sufficiently senior to be taking significant operational decisions whilst still retaining a clear identity with their working group rather than the corporate departmental management teams. To obtain typical individual frequencies of interaction, the grouped frequencies in Figs. A.3 - A.6 were divided by the numbers in each group (having averaged the cells with two figures), and the results for the five individuals selected are shown in Fig. A.11.

In an endeavour to represent these results graphically diagrams were plotted for each function and for each individual showing the 21 nodes from which responses were recorded around the perimeter of a circle and the individual concerned as the central focal person. The resulting "primary stars" (Barnes 1969) are illustrated in Figs. 6.8 - 6.12 of Chapter 6.

As has been indicated above, individual responses to questions regarding the effect of these links on job satisfaction (section 5 of questionnaire) followed no particular pattern and were not used subsequently in the investigation. Replies regarding sources of change (section 6), dissatisfaction (section 7), and satisfaction (section 8) were more informative.

Results are summarised in Figures 6.14 and 6.15 under Chapter 6. Responses with regard to job satisfaction were re-categorised under headings employed by Herzberg in his investigations and are shown in Figure 7.1 (and plotted in Figure 7.2) of Chapter 7.

A.2. INDIVIDUAL PERCEPTIONS

The questionnaire provided information about the links in the network. To explore the experiences and perceptions of the "nodes" 29 individual interviews were held. 25 of those interviewed came from the groups whose contacts were examined in detail and illustrated in Figures 6.8 - 6.12 of Chapter 6. In addition four elected Members were interviewed because of the significance of their role for professional officers during the period under examination. To ensure that interviews were comparable an Interview Record sheet was prepared after the first trial interviews, and is illustrated in Figure A.12.

INTERVIEW RECORD

Date

1. Name of interviewee Post
2. Explain object of study
3. I want to talk about you at work
 - a) What is the objective of your work?
 - b) What is its value to the community?
 - c) What is its value to you?
 - d) What do you understand by job-satisfaction?
and self-expression?
 - e) What is most satisfying about your work?
and dissatisfying?
 - f) The following six attributes may be associated with your work.
Place them in order of value to you.
 engineering experience ☐ opportunities for advancement ☐ autonomy ☐
 memberships of professional community ☐ challenge ☐ contact with colleagues ☐
 - g) Has the make-up of your job satisfaction changed over recent years?
 - h) Has the nature of your job changed over recent years?
4. Now I want to talk about the other groups you work with.

- a) Are you associated with;
(often, sometimes, never)
- b) What do you think are their objectives?
- c) How do they influence you in your work?
- d) Has this influence changed over recent
years?
- e) Does this involvement and change
influence your job satisfaction?
- f) If you have a difference of opinion
how is it resolved?

Direct Works	Transportation	D & C	Laboratory	Public	Members	District Officers	Senior Management

5. What do you think is the most significant change for highway engineers in recent years?

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