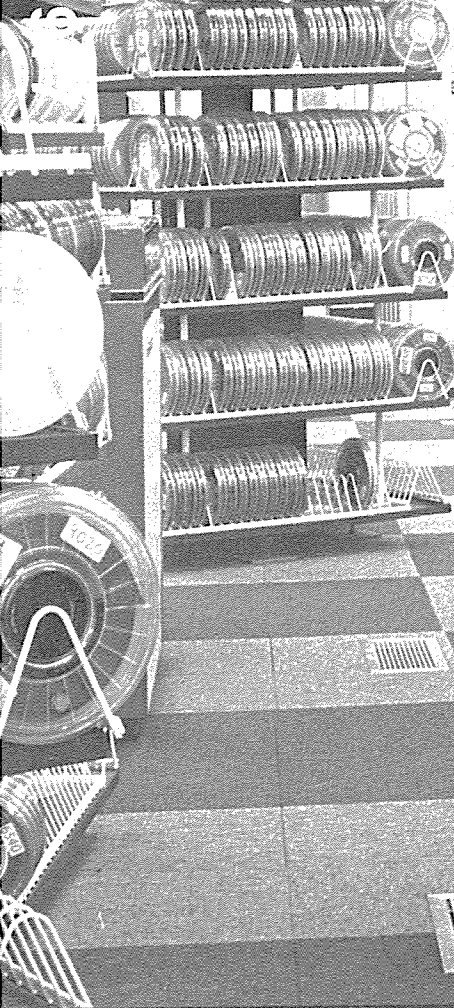


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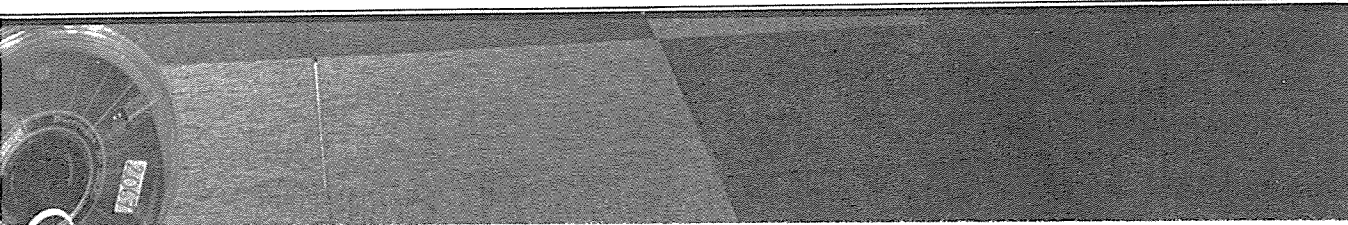


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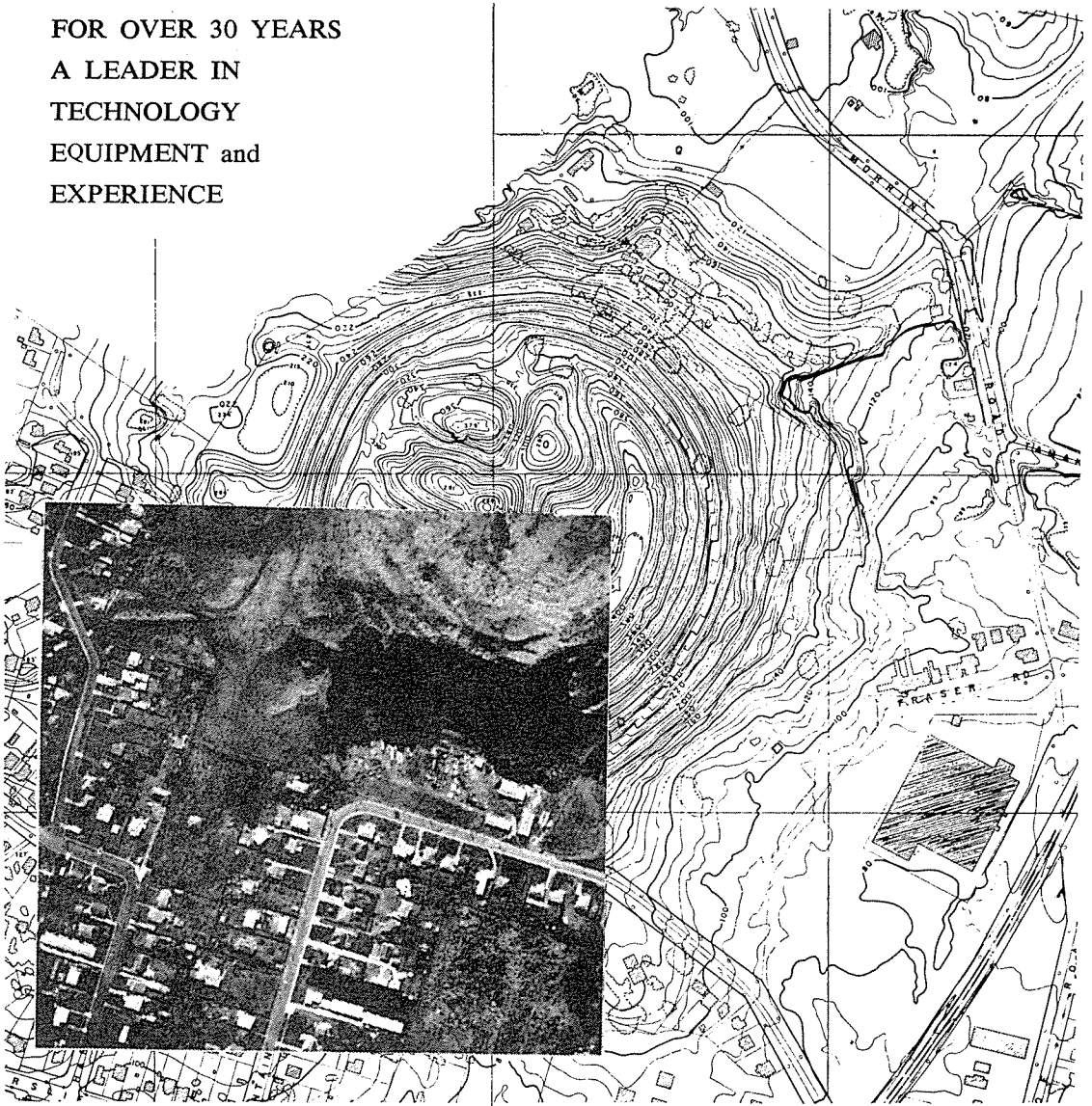
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Town Planning Quarterly

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Editorial

Will Planners Ever Count?

It is almost two decades since the Journal of the American Institute of Planners first devoted a whole issue to a progress report on land use and traffic models.¹ This was the first overview of the new direction which planning work had taken following Mitchell and Rapkin's proposition in 1954, that urban traffic was a function of land use.² Not only were there considerable shifts towards increased measurement and the quantification of relationships between urban phenomena as a result of this new line of thinking but it also produced an enormous volume of literature espousing a 'systems view' of towns and cities, and of the process of planning itself.

As one of the high car-ownership countries of the world New Zealand joined in this motor-age planning. Auckland kept up with Detroit with its master Transportation plan of 1955³, Christchurch slugged it out with Chicago with New Zealand's first computerised transportation study⁴ and during the 1960's the ubiquitous North American consultant was giving packaged treatments to other N.Z. cities. With more than a little help from the excellent computer programmes and how-to-do-it manuals of the U.S. Bureau of Public Roads, transportation planners in N.Z. rose to the opportunities both at home and overseas. With due allowance for scale and budgets, they performed on a par with similar professionals elsewhere in the review and updating of transport studies.⁵

Not so for the N.Z. land use planners however. The quality of land use inputs to transportation studies seems not to have been of such general concern here as elsewhere.⁶ Whether as an effect of inflation on the road-building potential of the National Roads Board dollar or from considered timeliness, the Road Research Unit of NRB in 1975 sponsored a 'state of the art' review of land use modelling.⁷ One of the recommendations of that review, carried out by a team from the University of Auckland, was that a seminar should be organised for the purpose of acquainting N.Z. planners with the latest state of the art in urban modelling, and discussing possible N.Z. applications.

This issue of TPQ contains the main papers given at that seminar held August/September, 1977, and reports the highlights of the proceedings.

Fisher's paper underscores the changed nature of contemporary urban planning, examines some current urban issues and outlines the contribution that quantitative techniques might make to planning. His conclusion is that modelling can be of assistance to a wide array of contemporary and prospective urban issues providing several prerequisite conditions are met.

Latham, representing a N.Z. planner's view, exhibits perhaps an above-average willingness to be lead to the modelling water but has some firm preconceptions about the qualities that will make it potable.

Wigan's paper takes a closer look at the structural form of modelling and systems thinking in an urban context and

reviews some of the more successful practice. Wigan's approach is cautious but positive. He advocates continued refinement of models to enable them to consider both wider and finer policy and planning issues but, as he said in speaking to his paper, "Don't trust them further than you can question them."

Harris' paper deals with some of the problems of the Department of Statistics in meeting the statistical needs of local government and planning. His remarks indicate the developing willingness of central government agencies to assist local and regional agencies particularly in the area of centralised data collection. Clearly a necessary precondition of further progress in this will be closer co-operation between Statistics Department and regional statistics users.

Also reported in summary are the activities of workshop groups, 'Rosemary's problem' a sample of the sort of issue raised and discussed at the seminar, and an edited version of the final overviews expressed by Fisher, Wigan and Foster.

The seminar was useful for those who attended. Its most disappointing aspect was the lack of support given by town planners. Many N.Z. planners may have heard about the pitfalls discovered in the early North American experiences of urban models as reported by Lee⁸. But they should also have heard the more positive side of the story given by Batty⁹. What matters now is that they provide an appropriate professional response to the current task of managing New Zealand's urban and rural resources.

If town planners are going to meet that challenge they will need to use appropriate quantitative techniques, know more about what is actually going on in the N.Z. systems of settlement and make recommendations relevant to today's problems. Without these abilities the town planners may find the real planning is being done by someone else.

Morris Taylor
Guest Editor

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Modelling and Urban Policy

N.W.F. Fisher

Norman Fisher is First Assistant Secretary (Development), Department of Environment, Housing and Community Development, Canberra.

As keynote speaker I see my task to be that of setting the approach this seminar should follow. This paper focusses on two issues: first, what are the major urban policy issues that communities and governments, will face in the next decade?; second, how can models¹, and modelling skills best be employed to cope with these issues?

There were two possible ways of meeting these points — I could, in a sense, say, "tell me your model and I will suggest a policy application." Alternatively, one could outline the likely policy issues and then discuss the modelling work that could be relevant and helpful to these issues. After a brief perusal of the urban science/planning literature I had no hesitation in choosing the second since modelling in pursuit of relevance **cannot** be encouraged by people facing the continuing pressure of urban decisions.

Before proceeding further, it may be helpful to emphasise the background of my perspective on urban modelling. I am an economist who first worked in the economics of electricity pricing and investment, who then became expert in the evaluation of road projects and the assessment of road finance. For the past four years I have been responsible for administering programs for sewerage, water and urban transport, and most of all advising on an array of urban development policy issues. I therefore know, but clearly am not part of, physical planning at the micro scale.

Given these background points this paper attempts the task of:

- identifying the nature of urban policy, and more importantly the major policy issues on which the community will look to us for guidance in the next decade;
- identifying an array of urban models and issues to ensure the seminar has in mind the wide array of subjects and techniques, even when the focus is from time to time somewhat narrower;
- to comment briefly on the people, institutions and actions most likely to achieve the maximum effectiveness from urban modelling for policy purposes.

Urban Policy Issues

An immediate task is to define or describe what is meant by policy, and my approach is decidedly

pragmatic. Urban policy is:

- what governments — national, regional or local — decide and professionals advise on;
- usually the implicit essence of, and sum of, a series of government actions/programmes rather than an explicit statement from which actions are derived;
- usually partial and in a state of flux (i.e. developing/refining) rather than a comprehensive statement made at one point in time and then subject to regular revisions.

This approach, based on experience, reflects the continuously changing variety of urban actions, issues and solutions. It obviously implies a far broader canvas than that of urban physical planning, and that usually the responsibility of urban or planning agencies. If at times, my broader perspective creates difficulties for this seminar I can only note that it is the real world.

But what are the urban policy issues of the next decade? Any list has to be somewhat idiosyncratic, but I believe the following will be the major concerns, not necessarily in order of importance.

1. Urban development — this has, of course, been the principal focus of the past, both in the sense of physical extensions to our major cities, and also the continuous attempts to accelerate the growth of some cities to serve special developments or relieve the pressures on others. Our expectation in Australia, is that we will add almost as many households to our population in the next decade as the last, notwithstanding a substantial slowdown in population growth. **However**, most cities with our form of urban development — low density with mixed private/public sector action — has found that the costs of relatively uncoordinated development have risen relative to income levels so that more young households are being precluded from home ownership. Furthermore, as a colleague and I have recently outlined², there are compelling reasons to believe that the supply of public finance for (urban) capital works will fall increasingly short of demand, and thus impose a **major constraint on further urban expansion**. In these circumstances, the passive approach to urban development which is the heart of traditional land use planning is becoming obsolete. The emphasis now is swinging towards the ongoing urban development process, rather than specification of an end state plan. Resource allocation (that is budgeting), and physical coordination is superseding spatial planning.

2. Urban management — This term is by way of contrast to urban development, but includes redevelopment and renewal. I am really describing the process whereby, given only modest expansion of our cities, we concentrate more professional attention on the management, and achievement, of desired changes in land uses and activity patterns in existing urban area. For example rather than responding to pres-

asures for changes in land use zoning, government agencies will involve identifying unused capacity in existing infrastructure and other public services and identifying and encouraging changes in urban options to take up such margins. It will, again involve a switch in emphasis from building new houses to making more efficient use of the existing housing stock.³

3. Energy In this country I do not need to elaborate on the major development of the last five years, namely the rising cost of energy. Whilst most observers expect energy costs to remain high relative to incomes and costs generally, or even rise further, it is far less certain what will be the impact on urban life. We would expect that the rising cost of mobility will encourage a change in traffic mix, in the balance between private and public transport, and in the relative locations of jobs, homes, and other services. It will also encourage a rethinking of design characteristics of our buildings — houses, offices, factories and other buildings — to conserve energy and a change between energy sources. Will these various changes be adequate or anticipated?

4. Housing Major focii of housing policies in the recent past have been — provision of shelter for low income households, maintenance of a steady and high level of new housing construction, with perhaps some attention to rental housing. These policy concerns are now being extended into a variety of new areas. For example, where is low income shelter being provided? Is the housing market responding adequately to demands for new housing styles? Should consumers be assisted to make more informed choices on such styles? Can the efficiency of the building industry be improved? Can the market be made more effective as an allocation mechanism for existing housing? How can the design and construction of dwellings, subdivisions, and associated public facilities, be improved to provide a more satisfactory neighbourhood environment? Will mobile housing be a feasible and acceptable form of alternative shelter?

5. Employment and economic development After an historically unusual period of economic prosperity and steady growth, most western countries are now facing serious problems of unemployment, slow growth and inflation. Given the urbanised nature of our countries the problems are especially evident in our cities, where secondary industry is concentrated. These problems may be regarded as primarily the concern of economic, rather than urban, planners. However, in several Australian cities structural imbalances between employment and residential location has exacerbated the unemployment situation, and highlighted the need for a more purposive approach to home/job location matters. There are also increasing problems in pursuing environmental objectives in a manner which does not impose unnecessarily or unreasonably extra costs on industry

to the detriment of viability and employment.

6. Environment The trade-off between environmental and economic efficiency objectives has already arisen in Australian cities in several ways e.g. motor vehicle pollution, port development. It is clear that the environmental momentum will no longer be sufficient to secure environmental protection targets, and that the identification and analysis of alternative environment strategies/options will be critical to further progress. This will mean, inter alia, a more thorough approach to environmental monitoring and management. For example, the development of air and water quality areal management plans.

7. Mobility and transportation The policy concerns in this sector have changed continuously over the past decade or so, and many major changes will continue into the next decade. However, my observations suggest that planners are still taking a fairly passive approach to urban mobility. That is, planners, with some exceptions⁴, are still presuming capital funds will be available to sustain the physical expansion of this (expensive) sector, and that there is neither need nor scope to use transport as an urban development instrument or to vary urban activity changes to reduce the demand for new transport capacity and make fuller use of existing transport capacity. These will be challenging issues for urban land use and transport planners.

8. Social A "turbulent society" with major economic problems, will generate an array of urban social problems with which we are singularly unprepared to cope. For example, most western cities are suffering from acute levels of youth unemployment and no early prospects that they will disappear. The social alienation our youth are learning may yet lead to a degree of anti-social behaviour we have not seen in our lifetime. In a different dimension the aging of our urban populations will create new issues for decision makers, especially in so far as our suburbs tend to be segregated, by age even if not socio-economic or racial grouping.

For some of you this review may seem both exhaustingly depressing and substantially irrelevant to urban modelling. The point I wish to make is that many if not most of these issues are susceptible to numerical analysis. There is thus a substantial challenge to quantitative modellers to venture forth from the traditional fields where irrelevance is a live prospect.

Modelling of Urban Issues

The array of urban issues I have presented may seem too heterogeneous, and too different from the traditional modelling that has derived from urban transportation studies, to be manageable. Certainly there is a wide variety of issues, which will require a parallel width in approaches but they are, in my judgment, all susceptible to and in need of numerical modelling. I propose to illustrate this view in the context of

three different dimensions of urban modelling.

First, it is useful to note that models can be used for different purposes. They can be formulated and calibrated to simulate just the current or recent experiences, that is to aid understanding of the urban processes; alternatively they can be developed for forecasting purposes. For example, econometric models of the demand for public products such as electricity and water, can identify the strength of major factors determining demand, and also the significance of policy instruments such as pricing policy. In modelling literature and discussions it is usual to have a forecasting purpose in mind but for many policy purposes modelling directed merely at more detailed understanding of the current scene will be itself of substantial assistance.

My second point, is to emphasise that models need not be aggregative, that is, concerned with the sum of the actions of a large number of individuals or enterprises but can relate to individuals. For example, whilst aggregative modelling has been the main thrust in urban transport planning, macro-economic analysis and housing, some of the more useful insights into personal travel behaviour in the last few years has come from modelling at the person/household scale, that is disaggregative modelling will become more widespread and complement most usefully the aggregative, and unavoidably coarser, approach.

Finally, I would remind you that the logic of urban models can itself vary — they can reflect physical relationships, be derived from economic theory, or from social behavioural principles. And, of course, there can be 'mixed breed' models.

The new generation of Urban Models

And now I propose to outline several different urban models that can be used to aid analysis of, and advice on, a variety of policy issues. The coverage is illustrative, and not intended to be either comprehensive or indicative of the areas of most potential.

best known model is that formulated by Lowry which derives from urban economic theory. There are many derivatives or extension of Lowry, eg PLUM, but the focus on these models is very much on expansion of our urban areas. In the new scenario in which physical expansion will either be limited or avoided I expect that urban analysts will need to look harder for a different modelling approach. Whilst the scale and expense of the urban models under construction in the USA (at the National Bureau of Economic Research and the Urban Institute) is daunting these may still be a more appropriate guide to the future.

In a different dimension, many of our cities are concerned about the problems of the physical environment especially water, air and noise. I understand that air pollution may not be as serious a problem in most New Zealand cities as in certain Australian capitals and thus there may be less need for analysis and modelling or urban air-sheds. There may, however, be scope for modelling the pollution spume from urban major point sources. Perhaps of most interest is the development of models to simulate the quality and quantity characteristics of waterways and watersheds. Certainly the US Environmental Protection Agency has fostered both the development and application of these models on streams subject to, or serving, urban communities.

In so far as slower population and economic growth, and restrictions on funds for capital works, turn the emphasis in urban functional authorities from expansion of their physical facilities to achieving greater effectiveness with existing facilities, then a new array of models directed at operational and management issues will be needed. For example, the development of models to simulate the supply and demand for manpower at different levels over time will be more pressing. In sewerage and water authorities one can expect a renewed interest in modelling trunk and reticulation networks to, for example, aid leak detection.

One characteristic of our communities is high spatial mobility both in terms of daily travel patterns but also between different jobs, homes and places over time. In Australia, the major influence on changing patterns of human settlement is inter-regional migration rather than inter-national migration, and a similar story is true for changing patterns within our cities. This mobility of our people has the potential to be an important instrument in coping with energy/housing problems and making better use of our existing housing stock and other public facilities. The prerequisite for such an approach is a more complete understanding of the factor underlying this personal mobility. This will require not only econometric models explaining response to economic factors but also models that derive from social psychology and information theory about community links and perceptions of space and locational alternatives.

If you share my expectation that the availability of finance for capital works in the public sector will be both more constrained and less reliable, then we will need better analysis of financial flows, and management control systems. In our own work on capital finance prospects for urban development at EHCD we have been developing and using a budgetary simulation model for short-to-medium term assessments of likely scenarios.

Finally, in transportation I expect that there will be more emphasis in large cities on modelling city sectors, rather than the whole area as rising costs en-

courage a reduction in trip lengths. There has, already, been some attention given to the transport demand of certain minority groups and this will merit further modelling. Thus the 'opportunity model' may reappear as a major approach to aiding locational decisions on certain public facilities such as hospitals, universities, public service offices. Could I also make a plea for some modelling of the activity patterns and mobility, at the neighbourhood scale where most of our population (housewives, children and aged) spend most of their daily lives. This modelling may be a matter for social scientists, but I hope that physical planners and designers who create neighbourhoods do not continue to think it is all 'beneath' their high-powered professional concern.

Rather than continue with this list, I would prefer to comment briefly on the resources for a management of urban modelling.

Arrangements for Urban Modelling

The traditional form of urban modelling, as represented in urban transportation studies, has clearly been dominated by the engineering profession. The land use planners, economists and geographers have sometimes had some involvement, usually in 'sidelines' areas, or have worked on quite separate and modest fronts. Given my thesis that urban development will not dominate urban policy concerns in the foreseeable future, and a wide array of models and approaches will be relevant and useful, we should see a much greater array of professional disciplines involved in urban modelling. Some may think that this a recipe for multi-disciplinary teams but I have reservations as to this popular solution. I can certainly see much need for consultation between different professional groups engaged in urban modelling, but doubt if there will be much scope for multi-disciplinary models. My concern would therefore be to build cross-disciplinary consultative arrangements, such as this seminar achieves so well.

A related issue is good support for development and application of modelling techniques and skills. I would personally prefer to fund external (academic and consultant) studies on urban policy issues and let this include modelling if client and researcher agree this will contribute to the study objective.

Finally, I doubt the wisdom or practicality of developing an urban modelling unit in government, given the variety of issues involved and approaches needed. Instead I can see the value in encouraging government agencies to develop an increased capacity for policy analysis (including evaluation of existing policies and programs). In many cases good researchers will find that model building is a natural, even essential, means of obtaining a better grasp of many-factored policy issues.

Conclusions

Modelling can be of assistance to a wide array of contemporary, and prospective, urban issues. The form and techniques of modelling are themselves much wider than the traditional approach might indicate. If modelling is to be as useful as the problems require, and potential permits, several conditions will need to be met:

- reverse the approach so that issues chase models, rather than having models in search of applications
- a broader array of professions will need to be involved in urban policy advice/problem analysis/option identification and assessment/and thus modelling.
- research institutions will need to work as close to policy advisers as they have usually worked to planners/designers etc.
- the emphasis in modelling should be on relevance and timeliness: a thorough answer given too late or to a related but different question is, *prima facie*, a waste of scarce professional resources.
- the time horizons will be transformed — the previous short term of 3-5 years is now the long term, and the 20-25 year situation is too distant for all but the briefest outline assessment.
- the flexibility dimensions of options — that is how many later options are closed off/unimpeded/facilitated will be a major criteria to be persued in modelling.

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Urban Models: Expectations and Needs for Planning in Auckland.

M.M.B. Latham

Malcolm Latham is Director of Planning Auckland Regional Authority, Auckland.

My only experience with models has been in transportation and then only as an administrator, plagued with the effects of problems that develop in the use of conventional modelling techniques in transportation studies. Since I have no experience in modelling beyond one transportation study, I will speak with the conviction of one uninhibited by knowledge.

There is, I think, no place for large, expensive, lengthy, inflexible and refined models in the problems we are trying to grapple with. There are places for models that would help me understand more about the urban processes taking place. There would be a favoured place for models that might help in anticipating changes that might take place. I would settle for the lesser objective because I am sceptical that the state of the art at present can duplicate reality to the extent that anticipation is assisted where it really matters.

Desirable characteristics

The kind of models that would help me should meet five main criteria.

First, they should be simple constructions, aimed at **reducing** real life complexity to the barest essentials, **not** in progressive refinements aimed at duplicating real life complexity. The output from such simple models should be limited and the tasks to which they are applied should be chosen according to these limitations.

I am concerned at moves in the opposite direction, towards greater sophistication and complexity. The transportation planning process clearly displays the shortcomings of complex modelling. If it is the intention to construct models dealing with wide issues (than the relatively quantifiable transport issues) in the urban context, I would be very hesitant to commit resources to them. Cheeseman and Pouzecanski (1971) exhibit the kind of aspiration that concerns me "If planning objectives can be formulated in quantitative terms, then such techniques enable the planner to determine the course of action most likely to achieve those objectives. Planners, elected authorities and the general public that they represent are thus in a better position to consider what those objectives should be and to choose between alternative policies knowing the consequences and merits

of each. Towards this end, the development of more complex models and more sophisticated evaluation indicators is an obvious necessity."¹

I disagree absolutely. I want less complex models and a much less sophisticated evaluation technique. I hope you can tell me that the thinking in the quotation above is out of date and that is now possible to give me what I want.

Second, models must be capable of quick construction, testing and use. They should be disposable items. Change is too rapid to allow long periods between the decision to research an issue by means of models and the results of such research.

A model that can be set up from scratch to produce results which can be communicated within a few months is likely to be useful to me. One that takes two or three years is no longer useful. One that takes a year is of marginal usefulness.

For the same reason, there is little point in arguing that model construction is possible within short periods but results will depend on the availability of data. A model that requires data outside the range generally available has not immediate usefulness. A new data base may be able to be built but the lengthy establishment period has a strong bearing on the justification for such a model.

Thirdly, it follows that models should be cheap. A functioning planning organisation, such as the A.R.A. and even a research establishment, such as the University, has a very limited budget to put into exploratory work. If a model involves costs that seem to be marginal in terms of the rewards that result, it is not a good model. Secondary benefits, such as the increase in better quality data produced for our transport models, do not justify the building of more models. I would much rather be given a simple, fast, cheap model and tailor my expectation accordingly than be offered one that promises much and produces expensive irrelevancies.

It follows that my ideal model is likely to produce crude answers that need a lot of careful interpretation. If crudity is produced with simplicity, speed and economy, it is acceptable. A crude result will at least draw attention to the method; a refined answer may disguise the limitations.

Finally, and on a somewhat different plane, my ideal models will exploit their strengths by producing broad comparisons of alternative planning options. They will certainly avoid the trap of attempting truths about each scenario to which they are applied or which they produce. Comparative analysis will at least highlight the big differences and thus clarify promising areas of choice.

To sum up, the models I want to see will be easy and fast to build and they will be crude, cheap and comparative. So much for the type. What of the application?

Likely applications in Auckland

The Auckland Region has undergone a sudden change away from high rates of population growth (3% p.a.) to more modest levels (currently 1% p.a.), and it appears to us that this lower level of growth may be sustained throughout the next 5 years. One effect of the change is to add more years to the supply of serviced or committed land for urban growth. Present commitments are enough, we think, to satisfy urban growth in Auckland for 15 or maybe 20, years on present, lower, growth rates.

Therefore the need for modelling new extensions to the urbanised areas has temporarily disappeared, but we still face problems of choosing priorities within areas already committed. Our problems are fully described in a forthcoming discussion document (Auckland Regional Authority, 1977).

An example is the debate yet to be settled in the Authority and on the North Shore about development at Albany and the Orewa-Whangaparaoa area. It is possible to develop logical positions that would conclude:

- (i) that Albany should be developed in preference to any more development of the Hibiscus Coast
- (ii) that the reverse should hold
- (iii) that both should proceed
- (iv) that neither should happen

We have sparse verbal models to describe these options but they have so far been insufficient to clarify our thinking. Neither have they allowed our elected members to appreciate clearly the important public implications of adopting one option rather than another. Perhaps one of my crude, simple, cheap and comparative models could be built to achieve some more substantial basis for a decision. Possible objectives might include:

- (i) estimates of public sector financial investments of each option, discounted, accumulated and annual for X years;
- (ii) the impacts of each in terms of investment upon an assumed capital availability for the Region over X years;

- (iii) the lead times required for the various mains services under each option;
- (iv) amounts of employment required annually and aggregated, to support given home-work relationships North of the Harbour; and so on

Even if attempts at modelling this relatively restricted area of choice did nothing but clarify our thinking about the nature of the options that would be a help.

There are other decision areas of a similar kind currently under examination (Auckland Region Joint Study Group, (1977)) where a more rigorous analytical base could be helpful. Examples include hospital planning in South Auckland, selective enlargements of regional shopping centres, the effects of alternative forms of port development on the urban system, and power station siting.

These are some of the problems that appear and are hard to resolve in the present planning machinery. If models can not assist in these areas then I need to be told about the kind of problems where models could help. I am sure there is no shortage of problems in this Region to which model making could be addressed. There is however a serious shortage of useful research directed at problems which are relevant to the decisions my Authority must try to make. I have tried to indicate some of these relevant problems and the kind of models that we could use. Tell me if they match.

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The University of Auckland Department of Town Planning

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Urban Modelling Techniques: objectives and constraints

M. R. Wigan

Dr Mark Wigan is Head of the Transport and Traffic Division, Australian Road Research Board, Victoria.

1. Introduction

'Urban models' are two words welcoming a wealth of confusion, disagreement, suspicion, and uncertainty. The ground rules on planning for, assessing, and reacting to most urban issues have changed rapidly and are continuing to change. Models are no more than methods for keeping disparate types of data under control by picking out areas or issues of special concern and concentrating attention on a restricted range of effects thought to dominate.

"Models" could therefore be aimed at clarifying spatial perspectives by means including that of literally building a scaled down physical replica of part of an urban environment, or by means of a numerical description of the same situation which then permits a computer program to generate perspective pictures of the present or possible future physical environment by altering the numerical description held in computer storage, and then generating the 'picture' requested on a screen using the same connections between numbers and building shapes as before. We have just specified a computer based model of a physical system designed to provide a range of visual perspective drawings from present and specified future conditions, without the trouble of constructing a scale model and moving about to assess the visual integrity of changes within the model.

Much of the planning-oriented computer and mathematical modelling is as simple and straight forward as this process: the complexity arrives when an increasing number of 'simple' models are fitted together and asked to represent a large number of different elements (such as buildings, roadways, vegetation, etc. in our physical example). These two dimensions of:

- (a) number of elements within **each** such model; and
- (b) number of different 'simple descriptions'

are where the labour saving and storage aspects of a computer system become invaluable: simply keeping tabs on the detailed physical location of the physical elements in a Local Government area of control, and keeping events (such as accidents) and records (such as rating data) on the same basis leads almost at once to such major systems as LAMIS (Local Authority Management Information System (ICL(1975)) which provide, to managers of urban environment, in

their own right as **descriptive** models, a quite remarkable increase in understanding, control, and speed of reaction. All models must start with such data descriptions, and at the urban scale the variety of types of data leads at once to an excess of information sources and a paucity of usable information on comparable bases for most ad hoc issues. Geographic coding systems have a quite disproportionately beneficial potential to improve this situation, and are increasingly used to do so.

2. Activity Systems

The next level up from data description is — and must be — application oriented. A choice must be made of the activity system or systems of interest, and the degree of detail required. At the urban level the dominating interest can be the land use system: the housing turnover: the employment structure: the transport or other services: or population migrations. Each of these are tightly coupled to each of the others, although for any specific geographically oriented issue, usually one system or another dominates. The two dimensions of spatial and another descriptive classification (such as household type, SIC or SEG) can then be used to aggregate and simplify the representation of the problem. This might be presented as simply the obvious logic of excluding irrelevant or second order interactions, but the sad truth is that such aggregation is inevitable as a result of the sheer cost and time involved in developing and using detailed disaggregate data, and the poor statistical reliability of detailed descriptors developed from insufficient data. This reinforces the **appropriate** role of models once again: a well chosen set of linking assumptions to provide a consistent view of otherwise too diverse or too extreme a range of pertinent information.

The central distinction between the widely used and problem oriented area of interest of transport planning and the broader and more complex issues of urban analysis is that transport is but a single activity system within the urban content (Fig 1). Considering the different levels of aggregation at which urban analysis can be carried out, the broadest is concerned mainly with the regional level: here population moves in terms of migration following employment openings which follow investment at this general level: the mutual accessibility of each of these elements determines the behaviour of the urban region.

This high degree of aggregation makes it quite clear that for the proper consideration of the spatial interactions one level down from the regional view, that the time lags and feedbacks between changes in activity systems and regional reactions are inescapable. The regional environment affects the urban area by spatial competition and development influences which then alter the location of different types of activities throughout the urban system. This is

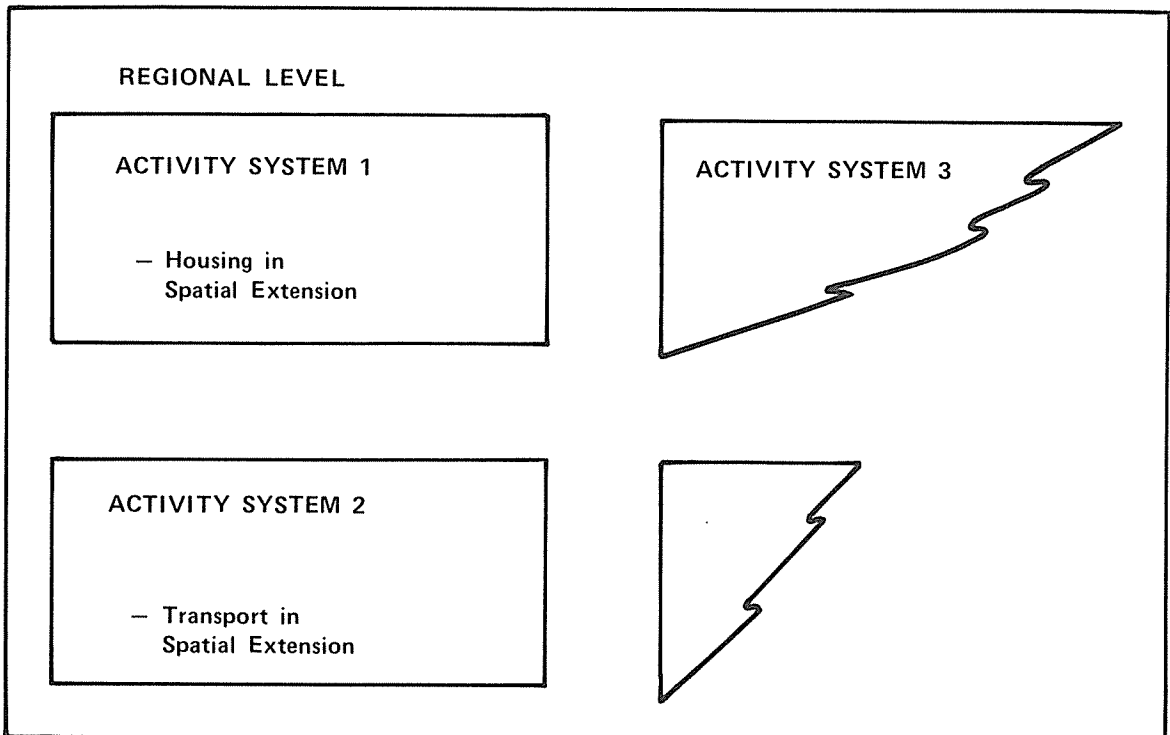


Fig 1: Levels of analysis for urban systems

clearly both a lagged and a feedback system, and the simple model of Forrester (1969) is explicitly designed to represent this process at the cost of virtually all other details at a spatial level. Forrester's model is simply a step by step calculation of the type shown in Fig 2, and the only variables of note are the time lags and rates involved: this type of model is completely deterministic: reflects only the feedback structure specified by linked lags and rates of change of highly aggregated variables, and is dominated by the initial conditions selected. Once these constraints are appreciated, the inadequate and contentious "results" of this MIT study are seen in context: that to a surprising degree, this simple dynamic structure co-ordinates many of the less obvious effects observed in cities over longer time periods.

Many efforts have been made to disaggregate this system, and a reasonable degree of success has been obtained by ignoring Puch's DYNAMO compiler, on which Forrester's model was based, and using the considerably better tools available for continuous systems modelling (e.g. the language CSMP) which do not suffer from the crudity of solution method embedded in DYNAMO to solve the differential equations which actually comprise Forrester's model system, and give useful broadscale representations of regional systems in an economic and easily understood manner.

3. Spatial Activity Models

3.1 Model forms

As soon as activity systems with spatial extension are of interest, then the dynamic interactions which dominate the highest level must be supplemented by specific spatial representations. The best known and most widely used modelling framework at this level is the family of Lowry models (Lowry, 1964). In their basic form such models represent a static equilibrium, where interactivity accessibilities are the major determinants of the implied distribution of activities, and the Lowry model resolves the policy and practical constraints applied by the user to determine an equilibrium spatial balance between employment, location, and population.

Fig 3, drawn from Senior (1976) illustrates the general structure. Employment is split up into location specific ("basic") and "population serving" sectors: the basic employment is part of the initial condition set externally to the model, and is assumed to be robust to small changes in population distribution. The population serving sector is explicitly dependent on both transport system properties and the spatial distribution of population. The residential sub model is driven by the journey to work specifications, housing market and activity rates. The probability of workers in one zone living in each other zone is the result, which leads to a population distribution.

The employment sub model for population serving employment is driven by demand in each employment sector, and the relative attractiveness and accessibilities. This leads to a probability of residents in one zone working in service functions in each other zone, which then permits employment in each zone and the journey to work flows to be calculated. A more detailed description (from Hutchinson, 1976) is given in Fig 4.

At first sight the initial conditions (exogenously determined basic employment) would seem to place the Lowry system alongside that of Forrester as an over-determined approach. However, basic employment rarely if ever, reaches 50%, and in practice the housing and service employment factors usually dominate as these are completely allocated during each run. The Lowry model does not allocate incrementally. Massey (1973) considers the basic/non basic classifications in detail.

The use of Lowry models usually employs some form of iterative technique, as an initial guess at employment has to be resolved with the other constraints. It is however, possible to formulate the Garin-Lowry system where, constraints excluded, the Lowry model is in closed form (Garin, 1966). A clear description of this derivation is also given by Batty (1972). Batty (1974) points out, however, that even for as little as three iterations through the

economic base, the Garin-Lowry model in closed form is slower.

3.2 Applications of the Lowry Family of Models

The Lowry model in one form or another has been the basis for more established U.K. models. Table 1 (Batty, 1972) illustrates this: Cheshire, South Hampshire, Tyne-Wear all use Garin-Lowry models, usually modified by a supplementary loop to resolve any service employment or population constraints imposed. Straight forward doubly constrained employment and population models are used to assess and alter the weight applied to the residential and/or service attractors. The effect of constraints is usually to reduce the predictive power of the model by hampering the allocation process, but giving the benefit of better descriptive power for the calibrated present.

Calibration is a central issue; data requirements naturally rise as constraints are added, but in many cases if constraints are not applied to zones external to the modelled area, then the urban centres attract too much activity and the close hinterlands too little. A clear set of illustrations of this effect is given by Batty (1974) for the Reading area. Unfortunately Batty's (1974) emphasis is that from several similar studies no 'package' model is likely to be definitive, as each model is so different. The cost of model operation is frequently high, hence the reported result that, through the use of pilot scale models for de-

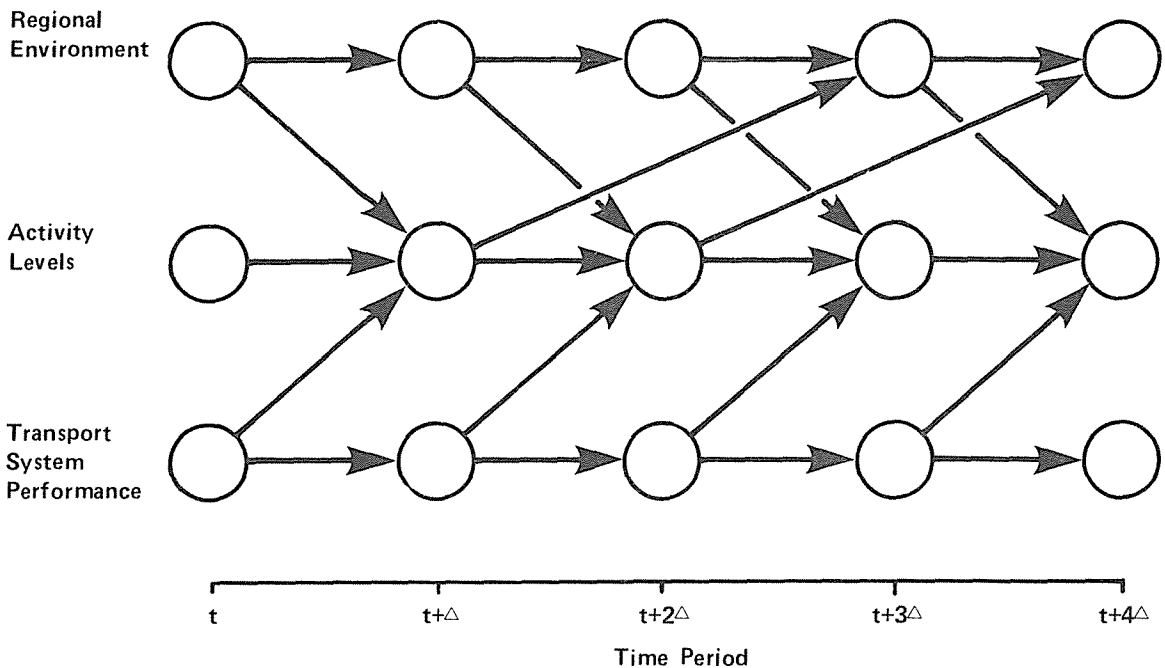
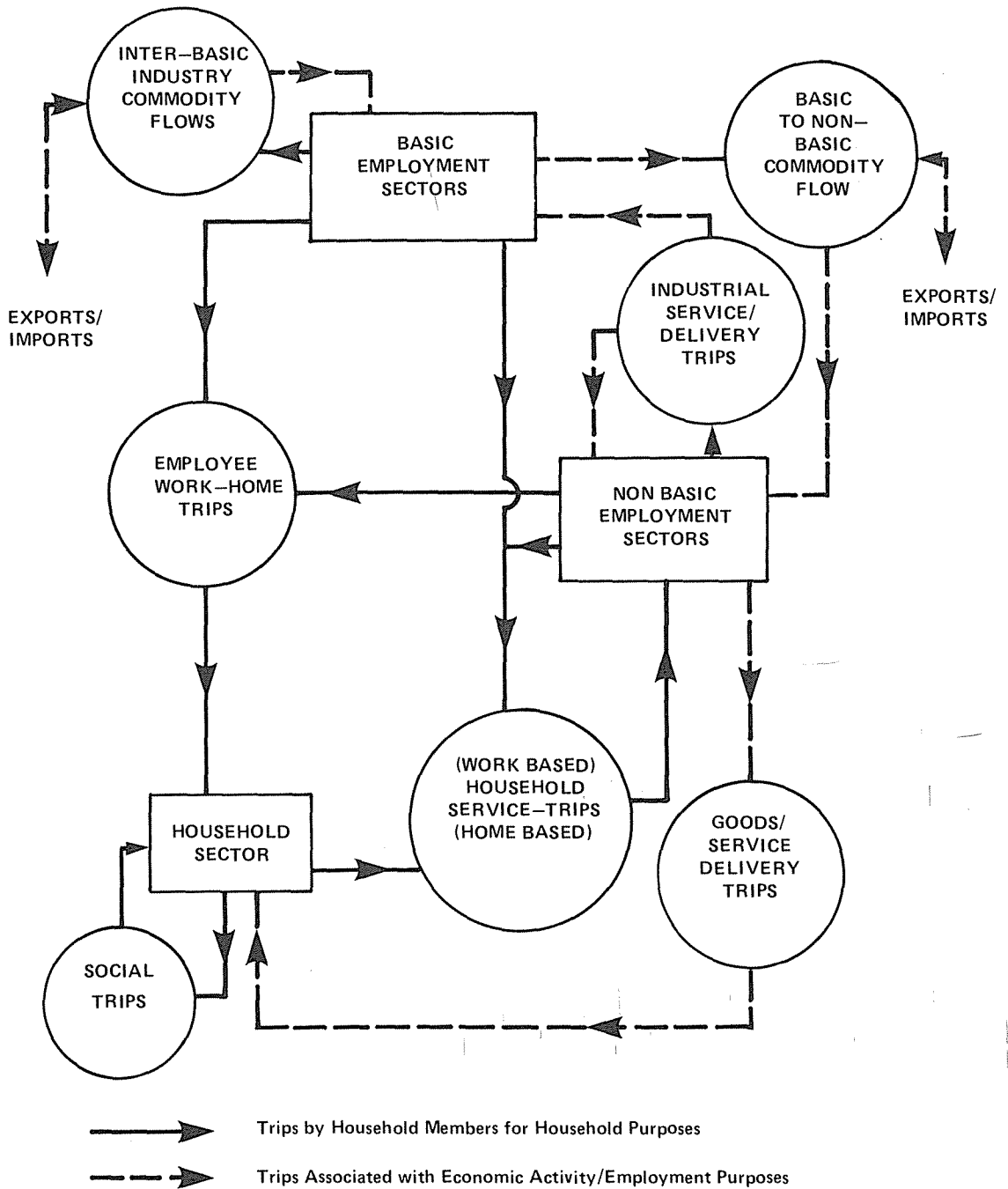


Fig 2: Dynamics of interaction



NOTE: By definition the basic sector will export most of its product but a small proportion of finished goods will go to the local nonbasic sector.

Fig 3: Interactions between and within the sectors of the Lowry framework (after senior (1976))
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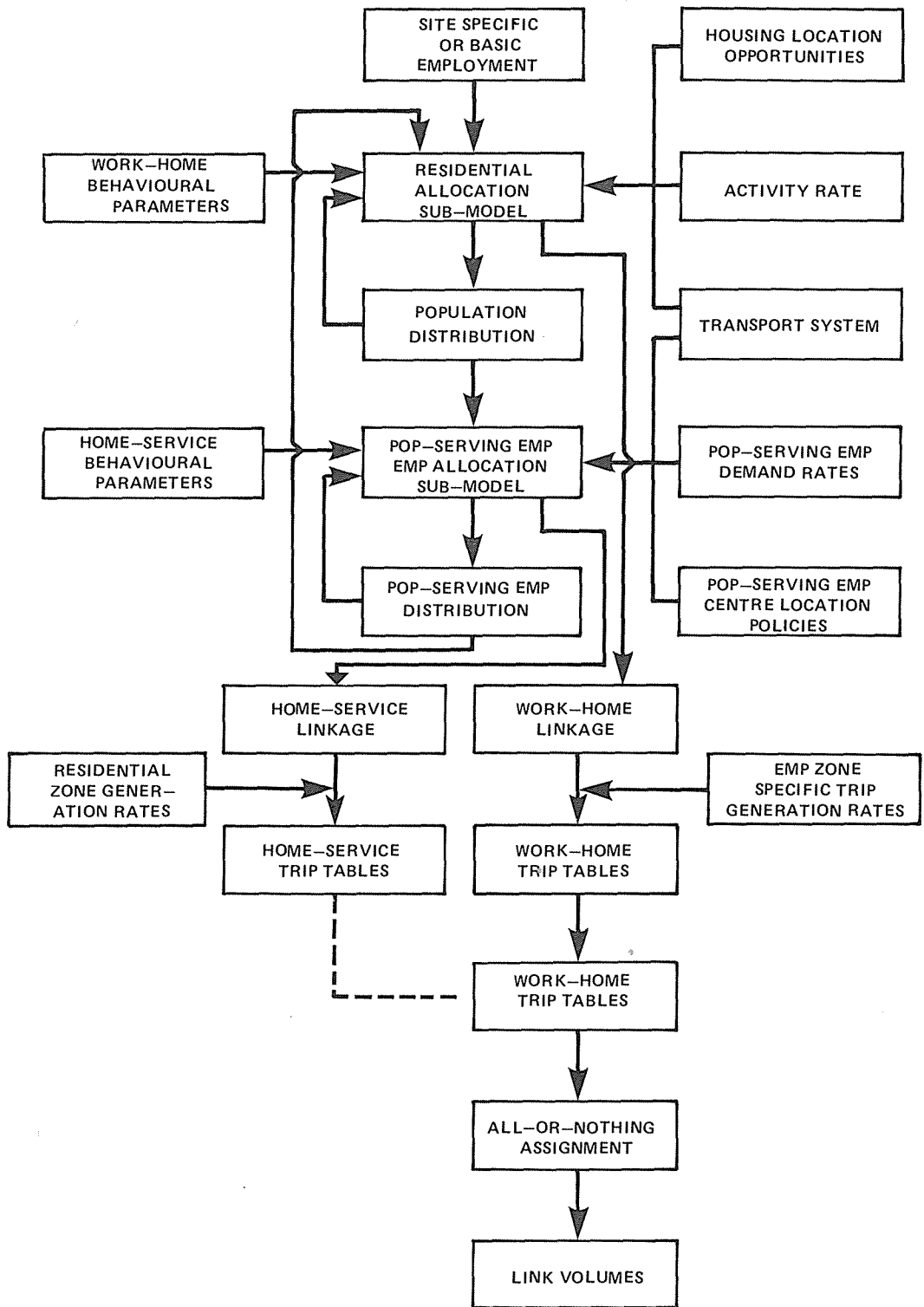


Fig 4: Lowry type land use - transport model structure (after Hutchinson (1976))

velopment, costs have been cut by 95% in 5 years and 60% in two, in the work of the Reading Urban Systems Centre. Thus permitting a wide range of possible options to be considered initially. The Lowry model used in Melbourne for the Outer Ring Study was drawn from the Waterloo system (Hutchinson, 1976), and after local adjustment worked effectively.

Inability to handle the locational constraints basic to planning is an excellent reason for model-induced distress among planners: It must be noted that at least one of the available systems of models (Mackie and Wade 1974) is unable to adequately handle this requirement — and no doubt contributed to the reluctance of many planners to consider such models. Many of the sub-models in the form proposed by the originators are either similarly constrained, too far from a useful representation, or simply insensitive to planning variables. The housing market analysis of Muth (1966) and Fishelson (1975) are examples of useful urban modelling approaches some way from effective application.

The systematic disaggregation of a Lowry framework requires a mathematical framework capable of handling both constraints and the generation of consistent interaction models for a family of related systems. The three major different ways of approaching this are —

- (a) the use of an entropy formulation, which provides a systematic technique for this task (Wilson, (1974)) in spite of systematic criticism of the style of model generation (e.g. Morigridge (1972))
- (b) replication within the Lowry framework (Echenique *et al* (1973)) which yielded a fairly good calibration in Caracas.
- (c) the approach from the tradition of input/output and other accounting table systems (e.g. Broadbent, (1973), Barras and Broadbent (1973, 1975)).

3.3 Other Spatial Activity Models

The Cambridge School of Echenique *et al* have had quite wide ranging acceptance of their resulting systems of models and have applied them in Tehran, San Paulo, Caracas, Santiago and several U.K. cities, with dynamic extensions. At different levels of detail the feedback loops are made more complex. The simplest level feeds back from final resultant regional cost at city level to the lagged regional distribution process: from the locational cost at zonal level to the lagged activity distribution stage, and from route travel costs to trip distribution. This leads to a number of exponential gravity model-styled functions very similar to those produced by Wilson's (1970) entropy system for model generation, and was regarded by the City of San Paulo as adequate for the task. The evaluation procedures used were produced by Flowerdew (1976), and included a number of elegant applications of Laspeyres and Paasche indices to express distributional effects. The transport

sub-model is minimal, and handles only routes where possible. At the next level of disaggregation described by De La Barra (1974) and Echenique (1976) the land use and regional sub models are treated in more detail. Floor space service employment and residential population are distributed by an Activity and Stock Model (Echenique *et al* 1969) very much as for Lowry. The transport model is extended to different modes, but still restricted to route representation. This system was used in Santiago (De La Barra 1974), but the most detailed model to date is the Caracas system (Echenique *et al* (1975)), yet even then the transport system is based on a route by route representation. An interesting emphasis of the Cambridge work is the continuing attention paid to indicators as a means of summarising results in an understandable form. Breheny (1973) provides a critique and development of evaluation indicators based on those of the Cambridge group.

The particular advantage of the entropy formulation is the ability to handle constraints: this provides an invaluable basis for handling the spatial and activity accounting required for urban and regional modelling. Constraints may be defined relating household, housing, budgets, rents and wages, adding a new dimension to these spatially disaggregated models. The town level of detail for urban models is considerably more complex than that of sub-regional systems.

The best reviews of activity and progress in applications work in the two fields (Batty, 1972) and (Boyce *et al* (1970)) both reinforce the view that the operational effect of plan making has been slow, and the spatial effects comparatively mild compared to activity system level changes. The good feature — in the U.K. at least — is that the bitter U.S. experience reviewed by Lee (1973) has been avoided.

De La Barra (1974) and Putman (1973) have both used a regional economic model to predict employment for the whole study area, and then used separate intra-urban industrial location models (Putman 1974, 5) (Mackett 1974) Senior (1976) proposes an input-output and Lowry system as a new target. Any such approach requires a re-examination of the transport systems models which need to be included. A typical example of the transport model family inferred is given by Wilson *et al* (1969). A simple diagram of the integration of other activity elements is given by Fig 5, Senior (1976), which identifies the key issue as that of supply specification.

4. Other Approaches

There have been approaches to urban systems modelling other than those discussed earlier. Some of these are mentioned here. They range from more or less sketch planning tools with intuitively respectable behavioural bases, to detailed, but deterministic models.

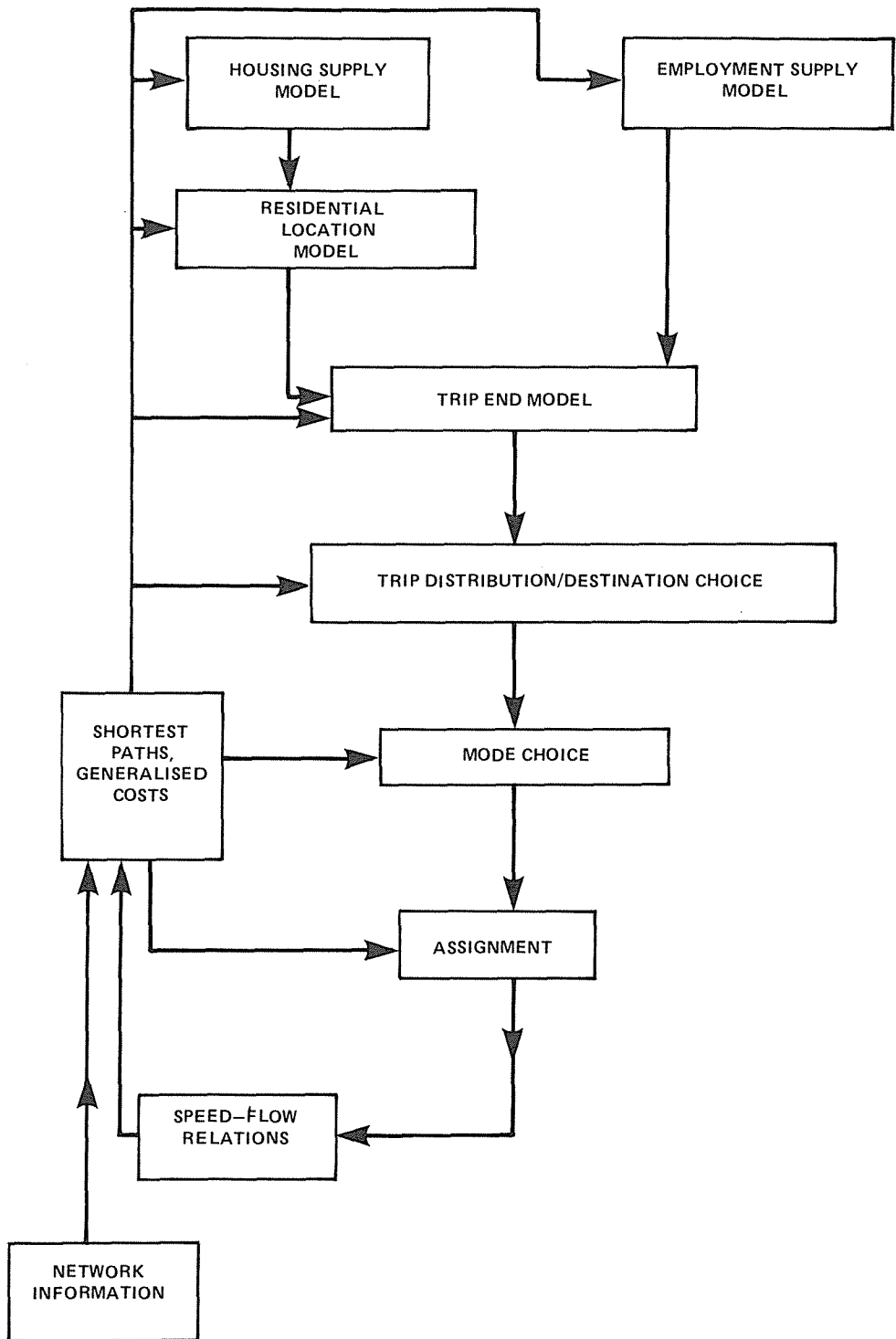


Fig 5: Land use model extensions of the conventional transport model (after senior (1976))

TRANSTEP (Nairn *et al* (1977)), carries out an incomplete semi-constrained gravity model calculation iterated through employment attractions, using the trip length distribution function interpreted as a probability of trip destination choice curve. This is a very swift and very simple calculation, which links directly to the CDC TRANPLAN transport planning suite (Fig 6). The demographic population distribution module is accessibility based; accessibility being given quantitative form via employment and job potentials (which are the equivalents of gravitational potential in the Newtonian gravity model); but modified by:

- (a) the observed population density trends of successive rings of urban development; and
- (b) the spatial distribution of land available for potential urban development, whether defined by physical or regulatory constraints.

Distribution is mechanically achieved by the allocation of successive increments of demographic/population activities. Recalculation occurs after each incremental allocation.

DODOTRANS (Manheim, *et al* (1969)), known for its equilibrium approach to transport demand modelling, also includes an activity distribution model. Again, this model is driven by relative accessibility changes; the only control being the (user specified) population holding capacities of each zone. It is not of the progressively-more-resistance variety; if the zone can hold n people then it is just as easy for the n th person to be accommodated as the first; but the n plus first person will be turned away.

Despite the relatively simple approach of DODOTRANS to the land use side of the land use/transportation planning coin, it does provide a brave attempt at constructing a framework founded on Neo-classical economic theory.

Both TRANSTEP and DODOTRANS have been used in Australia, but little use has been made of their land use activity distribution potential. Institutionally, land use planning and transport planning are still separated but even so both packages require refinement to their activity distribution models before transportation planners have enough confidence to undertake a second iteration through the total system loop.

But the spatial distribution of land use impacts is equally as important when it comes to evaluation. It is quite possible for several, say traffic restraint strategies to produce virtually the same macro-economic results, i.e. net benefits, but with totally different spatial distributions, and therefore socio-economic distributions, of impacts. In a study of possible traffic restraint strategies in Coventry (U.K.), this was precisely the result obtained (Wigan, *et al* (1976)).

Numerous derivatives of the Lowry model have been applied with varying degrees of success in the U.S. (Putman, (1974, 5)). Several of these: TOMM,

USM, etc., have also attempted to produce dynamic versions. In the case of TOMM, which was never completed nor calibrated, the introduction of the time dimension was achieved by adopting an incremental approach, which unlike its static brothers, recognised that substantial inertia exists in dynamic urban systems.

Rivalling the Lowry family of models for acceptance in terms of numbers of applications in the U.S., if not in terms of theoretical niceties, is the EMPIRIC model. The EMPIRIC model, as Putman (1975) points out, has virtually no behavioural basis. It consists of a series of simultaneous linear regression (difference) equations expressing relationships between various measures of activity (independent variables), and measures of the various constraints, both physical and regulatory (i.e. policy), that operate in a urban system (dependent variables). As the mention of the term difference equations implies, EMPIRIC is basically identifying the trends of certain variables between two time periods, but recognising that these trends are not just time dependent but constraint dependent as well. Unfortunately, if a particular policy did not operate over the calibration time period (recommended at 10 years) then EMPIRIC is powerless to assess any land activity affects arising from this policy. Furthermore, if an appropriate data base does not exist, many cities would be reluctant to wait the necessary 10 years to acquire one. On the positive side however, EMPIRIC does allow the service level of public goods and services other than transport infrastructure, e.g. the provision of sewerage services, to influence urban spatial patterns.

5. Current Directions

The Wilson school has recently set up their developed system of models (the "ITS" system) for West Yorkshire. One of the developments is the use of a dynamic model permitting variables lagged responses to activity changes. Consequently, the basic/non basic categorisation of the static Lowry approach is replaced by categories representing the rate of response to relocation stimuli (Mackett 1976a). The outline of the Leeds system is shown in Figure 7. A notable point is the use of a full, capacity and speed flow response assignment sub model: one of the interative links between supply demand and response missing from many other urban and sub-regional modelling systems (Mackett, 1976b). The number of feedback and lagged response loops is substantial and one result is that the major deficiency of transport-dominated models is overcome — that of evaluation in terms of flow (or derived demand) variables instead of in conjunction with the resultant activity shifts and spatial changes. The policy issues testable include urban redevelopment, low cost housing, new industrial or shopping centres, social mix, and transport network capacity changes.

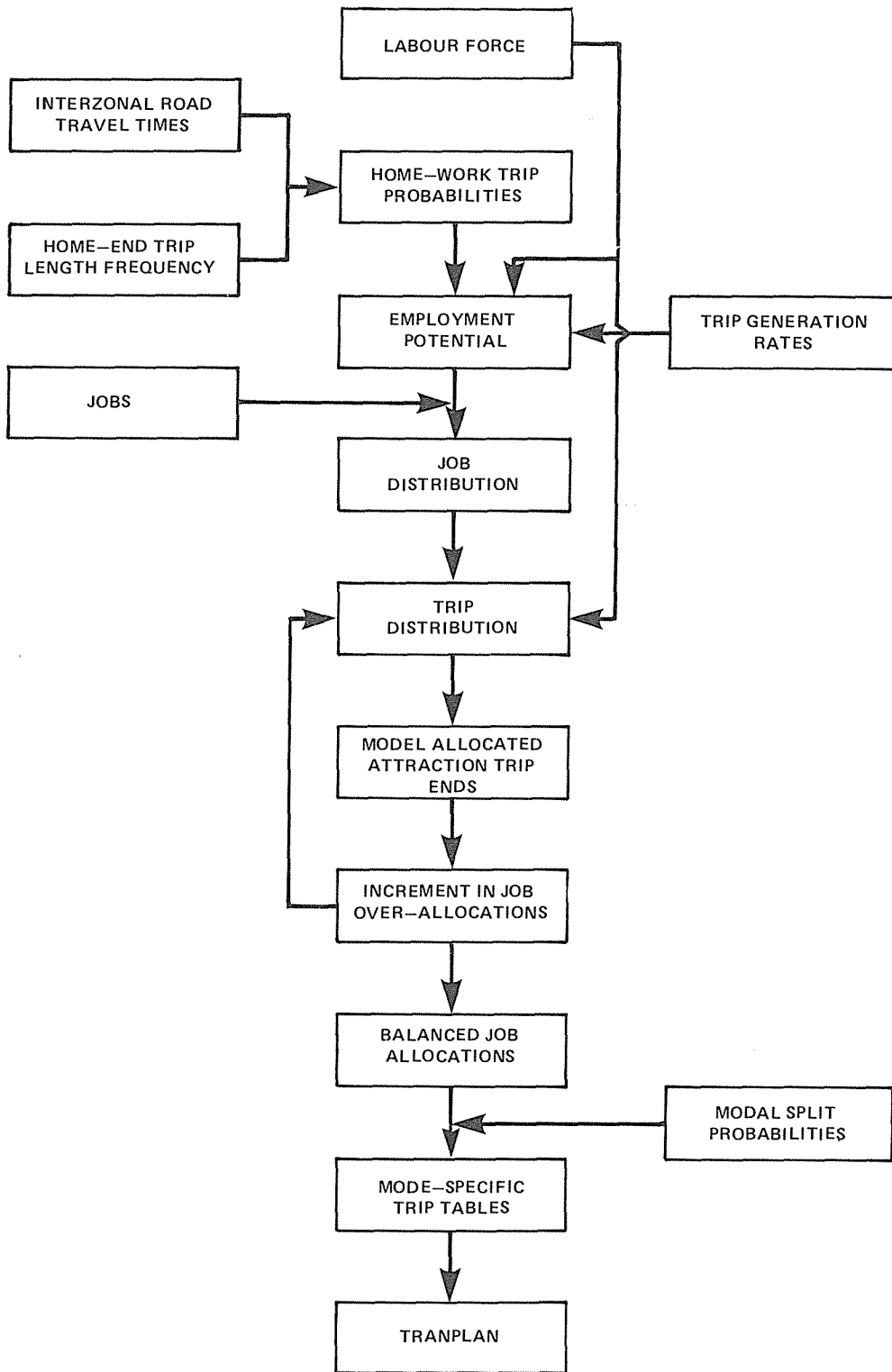


Fig 6: TRANSTEP land use allocation process (after Nairn et al. 1977)

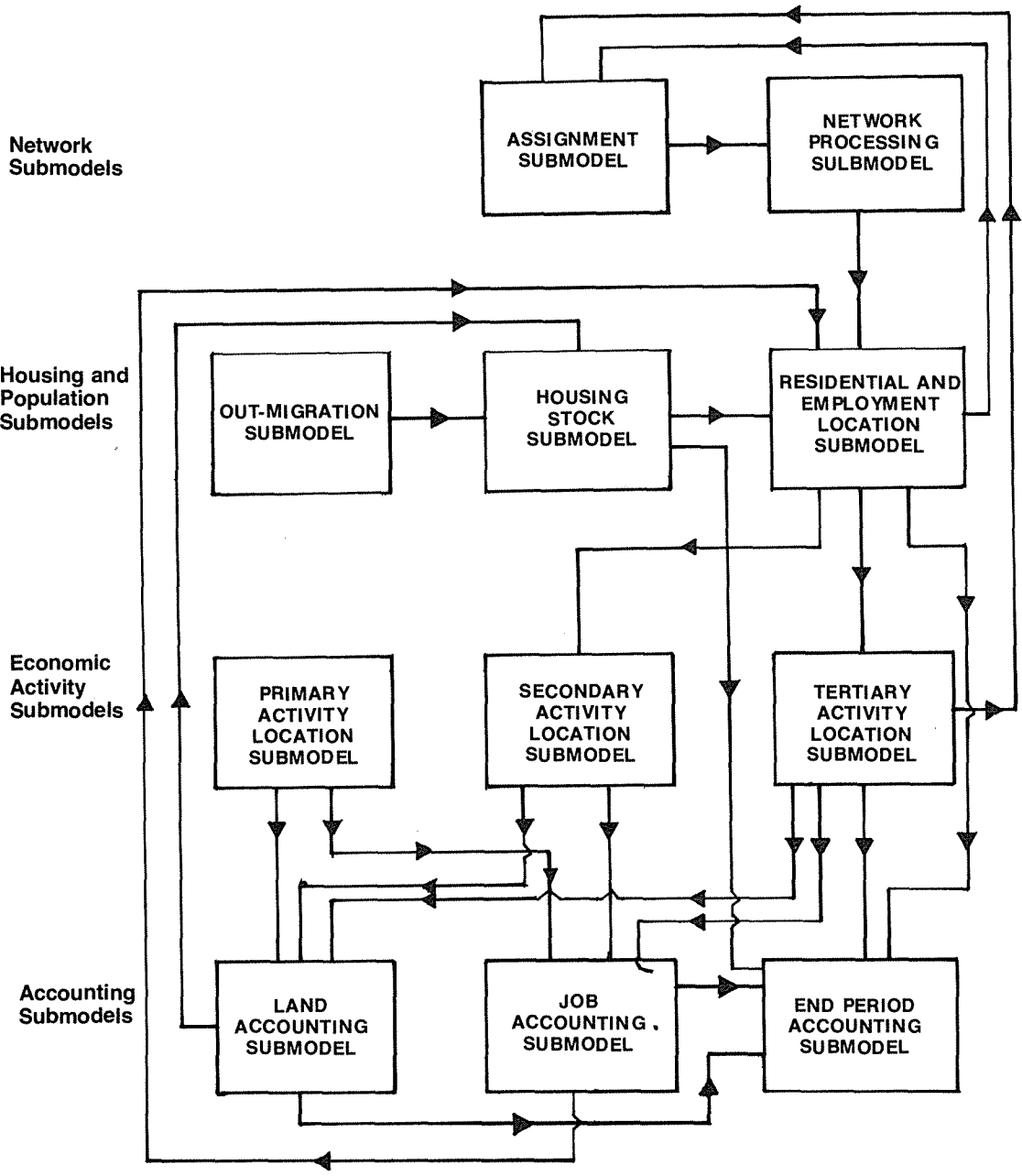


Fig 7: The relationship between the submodels (after Mackett (1976))

The significance of the combination of the last two issues hardly needs further emphasis: transport system management presently tends to over-shadow road construction, and the social and environmental issues raised by transport operations certainly include housing amongst this inter-related group of issues. The problem areas towards which models are directed are moving targets: perhaps this ITS model may be regarded as a metaphorical shotgun. Some of the obstacles to an earlier emergence of a pragmatic integration of land use and transport development analysis have included (Senior, 1976)-

- (a) the early and separate emergence of transport models and consultants
- (b) negative reaction to large scale models following the collapse of over ambitious projects (Lee, 1973) — e.g. Penn. Jersey.
- (c) the highway and civil engineering legacy of transport planning which slowed the integration with land use planning.
- (d) the long delay in the development of mathematical geography, and the consequent tendency to restriction of geographical activity linkage work to cross sectional association descriptors (e.g. Hoare, 1975).
- (e) a similar reluctance of sociographers to assess total activity patterns with spatial differentiation: the time budget system of Kobayashi (1976) is an example of the encouraging recent trends however.

6. Concluding Considerations

It is clear from the above brief, but wide, review that considerable advances have been made in the development of models for residential and employment activity allocations; trip generation, distribution and assignment; and, at a more micro level, for demand and network equilibrium analysis. The attempts to weld these models into a comprehensive urban planning tool have met with some success.

A reasonable intuitive reaction is to continue refining these tools to be capable of considering wider and finer policy and planning issues. Work in several research centres is being directed to this end. It is, however, timely to raise certain cautions regarding the directions for further research and development. They include:

- (a) Data quality: urban data bases are expensive to set up and maintain. Is it worth the effort to add to this task? What will be the gains if we do?
- (b) Model specification: Is it possible to specify a total land use/transportation model with the right degree of balance between land use emphasis and transportation emphasis? Which elements in existing models should be given priority in further research?
- (c) The relevance of equilibria: Are static notions of equilibrium relevant to the dynamic urban systems case anyway? Conversely — should the

models be structured to show directions and scales of changes in urban systems rather than seeking theoretical optima; and,

- (d) Models as a means, not an end: the task of models is to simplify, not to complicate; to distill and identify the elements which flavour the system.

Urban modellers must continually address these questions if they are to effectively develop tools which are relevant to the planning issues which are current.

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Information to be supplied in the coming year includes:

- details of information and information services available at the ARA planning division;
- publications, studies and surveys of relevance to planning in Auckland;
- recent data and analysis of:
 - population and labour force (growth, distribution and structure);
 - employment (changing distribution and structure);
 - land (patterns of land use and zoning, building permits, starts and completions);
 - transportation (urban traffic trends, airport, port and rail activity);
 - prices, wages and trade (consumer price index, house and auction prices, wage rates, retail turnover);
 - short and long term projections of population and employment growth and distribution.

Information will be presented in the form of tables, graphs and illustrations where appropriate. Data will be supplied for the Auckland Region, the four Urban Areas and fifty urban districts depending on availability. The manual includes all relevant maps.

It is planned in the near future to add sections dealing with floorspace, social and other economic data. The manual will be sensitive to users' requirements and will adjust and expand to meet their planning information needs.

The Auckland Regional Planning Information Service manual is available at an annual subscription as follows:

Non profit organisations, including local, ad hoc and regional bodies and government departments: \$35.00
Other organisations: \$50.00

Persons or organisations wishing to subscribe, should write, enclosing the appropriate subscription to
Information Section, Planning Division,
Auckland Regional Authority,
Private Bag, Auckland 1, New Zealand.

Information about the service can be obtained from Peter Etchells at the above address or by telephone, Auckland 794-420, extension 740.

Data Collection and Reliability

E.A. Harris

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Introduction

While the title of the paper originally set by the organisers of the seminar has been retained, I would commence by explaining that I do not propose to deal with the problem of data collection and reliability specifically from the point of view of the needs of urban modelling. The department has expertise in the application of modelling techniques in a number of subject-matter areas, but urban studies is not one of these.

Instead, I propose to deal in a summary fashion with the general problems facing the Department of Statistics in catering for the statistical needs for regional planning and of regional and local government. For some time now there has been considerable pressure on the department to meet a variety of demands for increased regional subject-matter statistics, and to provide greater access to fine detail statistics, right down to the unit-record level. I am aware that in some quarters the view exists that the Department of Statistics has been dilatory in facing up to these demands and that regional statistical developments have not been accorded the relative priority that they should have been.

I do not consider that this criticism is justified in terms of what has been technically possible within the department, given the total resources available for official statistical services, and the legal and operational constraints that apply to the operation of the service. I have been disappointed on occasions at the unwillingness of regional statistical users to recognise the reality of the difficulties to be overcome, but nevertheless, I am fully sympathetic to the need for a general improvement in regional statistical services and I hope that the measure mentioned later in this paper will indicate in part that a real attempt is being made to effect such an improvement.

Regional Statistical Obligations of the Central Statistical Service

The official statistical system, particularly the major component represented by the Department of Statistics, does not set its statistical priorities in isolation. Besides regular consultation with various categories of users, the system has been the subject of a number of major official reviews, covering its efficiency and the priorities to be accorded to the

various subject-matter areas of statistics and the development of new types of service.

Among the major reviews which have examined statistical priorities have been those conducted by the Technical Committee on Statistics which reported to the National Development Council in 1969¹ and the Inter-departmental Advisory Committee on Statistical Needs and Priorities in 1974.⁴ The former committee had a wide representation of statistical users, both inside and outside of central government and the latter committee, which while confined to Government departmental representation, was so constituted that particular departments were required to look after not only their interests but all those coming within their area of responsibility. Both of these committees dealt with regional statistics and the findings of the latter committee still provide the framework of priorities dictating the current work programme of the Department of Statistics, constrained only by the overall level of resources made available.

The advisory committee clearly stated in its report that the availability of demographic, economic and social statistics, classified by regions, variously defined, was a necessity for many purposes and with the then current and prospective future emphasis on regional planning and development gave explicit recognition to the need for a more systematic approach to the provision of such statistics.

My current policy dictating the allocation of resources among the alternative development areas in the department is fully in line with the committee's thinking, and while progress in implementing a number of fully-recognised needed improvements in the area of regional statistics has been relatively slow because of resource constraints, I think that the next year or so will see significant progress.

It needs to be stated, however, that progress will not be dictated solely by factors internal to the Department of Statistics. Regional users of statistics will need to do more to standardise their ideas on areal classification systems, particularly planning districts; come to a common understanding of what are the priority subject-matter statistical needs at the local government level; come to an agreement among themselves to accept the population census meshblock system of fine geographical referencing of data (at least until such time as the practicability of a grid referencing system is demonstrated); assist the department more systematically with local information needed to keep fine locational referencing system mapping up-to-date; and (dare I mention it) be prepared to meet at least a greater share of the cost of provision of the more specialist services demanded, particularly in the computer processing area. I touch on some of these points in more detail later in the paper, the other can be elaborated on in discussion.

Statistics Act 1975

You will be aware that the Government's statistical services now operate under the aegis of revised, modernised legislation, the Statistics Act 1975. I should like at this point to briefly outline the impact of this Act on the service my department can provide, and the provisions it makes concerning confidentiality, which is of major significance when it comes to finer geographical analyses.

Among the important features of the legislation are:

1. The co-ordination of all Government statistical collections;
2. The statutory provisions for the independence of the Government Statistician in the exercise of his duties;
3. The provision for joint collections by the Department of Statistics and other departments of state and local authorities.

The 1975 Act writes into law the long-standing precedent in New Zealand that after Ministerial approval of a survey, the Government Statistician has complete independence as regards questionnaire design, collection, processing and publication of information.

One of the most frequent (and often legitimate) complaints regarding the collection of statistics is the duplication of requests for the same information. To reduce duplication the Act provides that all Government statistical collections must now be approved by the Minister of Statistics. Before this approval is given the Government Statistician must report on the need for, and technical soundness of, the proposed survey. This procedure applies to surveys conducted by all Government departments, not just the Department of Statistics.

The objective of these provisions is to ensure that duplications and multiplications of requests for like or near-like details are substantially reduced, that acceptable standards are adhered to in surveys, and integrated statistics can be produced. Each Government department now has a statistical liaison officer to maintain close co-ordination with the department of Statistics on technical statistical matters including standard classifications, definitions and procedure. I look forward to the time when liaison officers with regional government are also appointed. This matter has already been discussed informally with a deputation on regional statistical services which I received earlier this year.

The new Act makes it a specific duty of the Government Statistician to define, lay down and promote such standard concepts, procedures, definitions and classifications for use in official statistics. Better integrated information is already being achieved as a result.

Reduction of requests on suppliers of information can also be brought about through more than one

Government department jointly collecting information. Provision for this type of joint venture has been made. The Statistician, after consultation with another Government department or local authority can recommend to the Minister that such an agreement be made and upon approval information collected can be exchanged as between agreeing parties. There is, however, as there must be in such circumstances, a right for a respondent to object to such an arrangement and on receipt of such objection, the information supplied by that respondent to one of the parties cannot be exchanged with the other. In all cases, the potential respondents must be told in writing that it is a joint collection and the purposes of the collection must be stated. A similar provision to this is at present in the Canadian statistical legislation and is working well in practice.

I see no reason why local government cannot in due course take advantage of this provision and I would be willing to consider proposals. I must say, however, that, as with departments of central government, it is not my current practice to enter into any such arrangement as regards any form of household survey, whether on a census or sample basis. I consider that public acceptance of joint arrangements for surveys dealing with personal particulars cannot at this stage be viewed with confidence. Accordingly my current practice is to confine joint arrangements to economic surveys of enterprises or establishments in some sector of the economy.

This leads me on naturally to the issue of preservation of confidentiality of collected individual information in surveys. The Department of Statistics, and indeed, all statistical units in other departments, are fully aware and very sensitive to the privacy issue. As an operating principle, my department assumes that any request for information from individuals, no matter how brief and apparently innocuous, involves some degree of invasion of privacy. Issues of balancing right of privacy against the Government's and other users' need for information for statistical purposes is always considered when questionnaires are being designed.

The confidentiality provisions of the Statistics Act 1975 concerning data collected for statistical purposes safeguard their use for these purposes. The provisions prohibit release of statistics in a form which allows the identification of any respondent. They make provision for all schedules and questionnaires (and completed copies thereof in the hands of respondents) to be immune from legal process.

To protect the respondent, the Statistics Act 1975 carries on in the tradition of its predecessors in clearly stating that no one not concerned with the data collecting organisation will have access to identifiable individual responses and such responses will be used for statistical purposes only.

If any other authorised department or agency is associated with the Department of Statistics in the collection, processing and analyses and interpretation of data supplied, in order to produce statistics and to carry out research based on those statistics, then their staff involved in the exercise are legally obliged to safeguard the confidentiality of the individual returns, even to the extent of taking the secrecy declaration under the Act.

The final point I would make under this heading is that the awareness of the Department of Statistics of the confidentiality factor in survey work and the insistence on procedures to prevent disclosure is not just blind adherence to legalism, and not just solely a recognition of rights to privacy. If public confidence that the use of collected data in official surveys was confined strictly to statistical purposes and that no individual disadvantage can result through participation in a survey was undermined, the quality of official statistics would be seriously impaired. While the law may stipulate compulsory participation, the high level of co-operation official surveys in New Zealand receive, I believe, is basically due to this confidence. Whatever developments in statistical services are entertained nothing can be done which will result or publicly appear to result in an effective lessening in the data security procedures.

Current Range of Regional Statistics

I doubt that I need to go into detail about the existing range of official regional statistics. You will have knowledge of such statistics in various subject-matter areas such as population, housing, building and construction, manufacturing, agriculture, and economic distribution, etc., covered by my department's work. Other departments also produce statistics in such areas as employment, transport, education, etc.

In the main a consistent higher-level areal classification is employed in the output of the Department of Statistics, but as regards the work of other departments there is often the problem of the use of inconsistent, specific administrative areal systems, which inhibit the preparation of integrated statistical descriptions and analyses. There has been official recognition of the multiplicity of regional classifications (over 70 in number) on a number of occasions in the past, e.g. by the 1969 Technical Committee on Statistics and administrative measures to try to achieve some standardisation have been proposed. However, the diversity of organisations involved in any rationalisation and the wide amount of non-statistical, administrative inconvenience that would be caused in the short to medium term by many of the changes that would have to be made have prevented any real progress being made. It is clear that some other form of technical solution must be found. I believe as discussed later that this lies in the wide-spread adoption of a common, fine geocod-

ing system of survey and administrative data and the use of computerised methods to aggregate data to whatever specific high-level classification is of interest.

Before leaving this brief look at current statistics, there is one further point that I would make. Increasingly, because of pressure on resources, the use of sampling methods is coming into use in official surveys, with supporting censuses at longer intervals to produce benchmark data for the construction of sample selection frames and to aid sample estimation process. In a country like New Zealand, where statistical populations under survey are not large by world standards, the sampling method, even if applied scientifically, is not as efficient as it is in larger countries. As a result many regular, shorter-term national sample surveys are not capable of producing much in the way of regional statistics of acceptable accuracy. I don't know the answer to this problem, except to try to insure that the supporting full-enumeration censuses are fully effective in meeting regional data needs.

Timeliness and Accuracy of Statistics:

As requested, I will now briefly discuss timeliness and accuracy of statistics. One of the most common submissions I received from statistical users, regional and otherwise, is the need for improved timeliness of release. For a period in the early seventies there was a decline in the timeliness of release of a proportion of the statistics produced by the Department of Statistics, caused chiefly by the unsatisfactory outside arrangement that then existed for computer processing services. Since then, however, a marked recovery has been made and the general standard of timeliness at present is as good overall as at any past time. In many surveys, given the inherent delay in the data collection operation and present technology for data processing, the timeliness of release is as good as is practicable. In other surveys, particularly major censuses, some further improvement is possible and this general question is always under review by senior staff of the department. Almost always, however, the problem does not lie in inefficient administration inside the department, but the quality and size of the resources, staff and machine, available to do the job.

Wherever it is statistically possible the practice of releasing early provisional statistics on some sampling basis will become a standard practice for major census-type surveys. The population and dwellings census is the major survey of interest to regional statistical users and you will be aware of the introduction of sampling methods for the processing of provisional national statistics from the 1976 census, which were released in December 1976. I discuss in the next section of this paper a further extension of the use of sampling methods for population census statistics of interest to users of regional statistics.

Associated with timeliness of release is the question of accuracy of statistics. Provisional statistics based on early returns can always be processed, but statistical care is needed to guard against significant bias appearing in the statistics based on such a self-selecting sample technique.

The subjective judgement of the statistician will be a part-determinant as to whether or not the figures to be released are sufficiently accurate to justify their use by regional planners and other. Retrospective checks on bias and the application of experienced judgement can usually substitute for the absence of quantitative criteria for deciding on maximum permissible errors before wrong decisions based on the statistics are made. In some cases of course the desirable position is to avoid provisional statistics, as these may be so misleading as to be worse than no statistics. My current policy is that efforts be continued to improve timeliness in release of statistics by additional early-estimate and provisional figures for various series, with suitable qualifications as a general guide for users.

(a) Ad Hoc Processing of Population Census Statistics Based on Samples of unit-Record Data:

An investigation within the department has practically been completed into an arrangement whereby ad hoc tabular statistics required by an agency of central or local government can be processed by the department based on a hierarchy of samples of unit record data from the 1976 Census of Population and Dwellings. This processing will require the commissioning department or authority to write its own computer program in a user-oriented survey analysis language (CENTS-AID), compatible with the survey processing instructions of the well-known SPSS package. CENTS-AID has been selected for use because of its extreme programming simplicity and EDP efficiency.

Users will be required to select the appropriate data sample size, and test the written program using supplied test data before production running. The Department of Statistics will not assume responsibility for the accuracy of any such processed statistics as the sample size selected and the program and the testing of such are solely the responsibility of the requesting department. Supply of the processed statistics will be conditional on a check that the output does not infringe any confidentiality provision.

The sample files will be created by the selection of a systematic random sample from the full edited New Zealand file of household and associated personal and dwelling unit-records. The range of sample sizes has not been finalised, but will include 10%, 1% and 0.1%, the two smaller sample sizes being produced by further systematic sampling of the next higher sample.

In order to eliminate possible identification of individual data, meshblock and, in some cases (the full

details have not been decided), area unit references will be removed from the sample tapes and substituted with Main Urban Area, Statistical Division and Statistical Area references; it will, therefore, be apparent that output will be limited to such areas, the exception to this being the 0.1% sample which will be on a national basis only.

The elimination of meshblock and other intermediate level geographic identification from census records will in most instances insure that details of individuals are not disclosed. However, the processing in combination of a number of variables for several of the smaller regions could result in an individual being recognised. To overcome such a possibility it may be necessary to collapse several of the classifications (e.g. income), rather than delete these variables.

Appropriate standard deviation data will be printed out to assist users and also to place on them the responsibility for the correct use of the data, given its sampling accuracy.

Appropriate documentation and instruction in the operation of the facility will be provided for users as soon as the arrangement is implemented. This requires some technical EDP work to transfer the package from IBM to ICL equipment, but should be completed later this year.

To assist in the testing of program parameters prepared by user organisations, the Department of Statistics will provide a test deck containing 500-700 dwelling and personal records, with each field covered and with as much diversity as possible in each field.

When tests are considered satisfactory by users, copy of the test results and program parameters will be forwarded to this department for production running. Before the department's EDP Control Section sets up a job, test results will be vetted, but no responsibility will be taken. Following production processing the print-outs will again be examined to insure that individual information is not being passed out.

The general policy to be adopted by the department in the supply of statistical data is (i) where similar information has previously been released by the department, the data will be made available to user departments with no restrictions; (ii) data which has not been released by this department will be marked confidential and may not be published by the user unless the approval of the Government Statistician has been obtained. The department will, however, especially where this duplicates scheduled processing, reserve the right to embargo any request received for sample census information. Census information, so derived, which is published must also indicate that it was processed with programs prepared by the user department as an effective agent of the Department of Statistics against sample information from the 1976 Census of Population and Dwel-

lings.

The initial costs in setting up this system will be borne by the Department of Statistics; all central government department and local authority users of the facility will be subject to a small labour charge plus all computing costs as charged out by the Computer Services Division of the State Services Commission, which operates the main-frame computer which services the Department of Statistics.

(b) Development of the Meshblock Geo-coding System

The Technical Committee on Statistics which reported to the National Development Council in late 1969 adopted a proposal put forward by the Department of Statistics that the meshblock area classification used at the Census of Population and Dwellings be used as the basis for a system of fine geographical classification of data for statistical and wider purposes. While the committee also recommended that longer-term investigation should proceed into the feasibility of later replacing the meshblock system with a rectangular grid system, the department's view is that the meshblock system will remain the only practicable system in the foreseeable future.

Since 1969 the department has introduced meshblock coding of data in a number of surveys and has made available on request a mapping service whereby any user can obtain meshblock maps for whatever areas are of interest, together with details of a key, if required, for translating the meshblock referencing system used for census field control purposes to the standard eight-digit system which is not specific to any census.

While the system has been used within central and local government and by private users, and further impending applications are known to the department, the facility has not been promoted as widely as it might have been. The view has been taken that the facility would in due course need some modification as the result of experience of its use and this has proven to be the case. However, I consider that the time has arrived when the department should more systematically promote the scheme and this will now be done in conjunction with some developments which I intend to describe.

Before doing so, let me briefly outline the background and technical statistical use of the meshblock system.

First, meshblocks represent the last stage unit of subdivision of maps used in the field control of data collection in the population and dwellings census, the higher levels of division being the census district under the charge of an Enumerator and the census sub-district, the area covered by a Sub-enumerator. At the 1976 population census there were 31,949 meshblocks (29,629 at the 1971 census and 23,500 at the 1966 census).

Secondly, they provide the elementary areal unit for the analysis of population census data, particularly population counts. Among the uses for this purpose is that by the electoral Representation Commission in its electoral district boundary-setting exercise.

Thirdly, because of their relative smallness, comprehensive coverage of the territory of main-land New Zealand, and the availability of supporting mapping and referencing documentation, they incidentally afford, whatever their disadvantages, a practicable scheme of fine areal referencing or geocoding, provided certain principles are followed in their future modification.

The general instruction given to the Lands and Survey Department for the 1976 census mapping was to (a) subdivide, if necessary, but not to aggregate previously structured meshblocks; (b) ensure that the boundaries are observable on the ground and thus can be satisfactorily interpreted by a census sub enumerator; (c) ensure that the boundaries can be technically described if chosen as the boundary for an electoral district; (d) generally aim for populations not exceeding 100-150 in rural areas and 150-200 in urban districts.

Unfortunately, about 3 percent of pre-1976 census meshblocks were altered by amalgamation or boundary adjustment with neighbouring meshblocks and these changes were not detected by Department of Statistics checking staff. This sort of revision will not be permitted on future occasions.

Following the recommendation of the Technical Committee on Statistics, the Department of Statistics has endeavoured to classify subject-matter survey data to the meshblock level of identification (in general this can be done more easily in the field than from office records). Meshblock classification was used in the Census of Distribution 1972-73, and will be used for the 1977-78 Census but limited progress only has been possible in other areas due to inflexibility of existing computer processing systems and doubts that all subject-matter data should be so classified in the absence of user demand. In the field work of the 1971 Census of Population and Dwellings, churches, schools, and other buildings, occupied or unoccupied, were classified into meshblock areas, and summarised totals produced.

In line with the department's stance on use of the meshblock as a building block to realign regional area outputs to users' requirements, some action was taken to subdivide a considerable number of the 1966 meshblocks, so that economic establishments (particularly factories and shops) could be classified into finer areas; other Government departments were also approached to see if they had any requirements, e.g. Ministry of Agriculture. Some exceptionally large rural meshblocks (some were over 100 square miles), were subdivided automatically to relate more to the term "small area" used by the

department, and to allow for possible future mining, etc., classifications requiring more compact areas. These actions were the main reasons for the increase of 6,000 meshblocks between 1966 and 1971.

A new departmental policy instituted for the 1971 Census of Population and Dwellings enabled production of 15 relatively simple table outputs for each of the 28,492 (1,137 were not populated) meshblocks, to permit re-aggregation of census data into users' areas.

With this background information before us, let me now explain future departmental intentions regarding this meshblock geocoding system.

Let me reiterate that at this point in time and for the foreseeable future there will not be a viable alternative to the meshblock system of referencing and the department recognises the obligation, in the light of experience gained, to now more widely promote the meshblock scheme. Accordingly, the stability of meshblock boundaries, except for subdivisions of existing meshblocks will be strictly adhered to and will be supported by a mapping and numerical referencing system.

The standard eight-digit numerical referencing system will be modified in structure so that all three last digits will be available to reference the full parentage of split meshblocks (this is not possible at present). The use of one digit, as at present, to indicate the timing of splits will be dropped and this information will be available in separate form.

Work is well advanced on the preparation of a street index to support meshblock location classification. This index will provide for each meshblock included streets/road or parts of streets/roads and for each street/road the meshblock or meshblocks in which it falls. I cannot announce precisely when the index will be available, but it should be within 12 months. Computerised methods of storing and updating the index and providing hard copy for users are being examined.

The department will shortly embark on a more thorough-going review of the implementation of fine geographical referencing of all its subject-matter survey data and modifications made to data processing systems accordingly. The facility to aggregate data to whatever ad hoc higher-level areas users require will thereby be extended as these changes are implemented.

More formal demands will be placed on regional and local government to assist the department in providing local information so that existing meshblocks needing subdivision will be treated in the most satisfactory manner and correct meshblock coding of survey units carried out. On the first point a balanced approach which provides the correct balance in meshblock structure between the statistical needs of the Department of Statistics and the needs of general users of the geocoding system will have to be followed.

As you will readily understand, the meshblock areal referencing system is greatly aided if local government boundary revisions are made so that parcels of land affected comprise either one or more existing meshblocks and undue division of meshblocks is not involved. Representations have been made on this matter in the past and the response has not been all that accommodating. It is proposed to once again take this matter up with the Local Government Commission and other appropriate bodies.

A decision has yet to be made on the mechanics and timing of meshblock revisions (subdivisions). There are arguments in favour of both progressive revision and regular revision at fixed intervals (matching, for example, the inter-population-census period). On balance, I tend provisionally to favour the second course, but a firm decision will be made shortly after all the factors have been fully explored. (Organisation changes within the Department of Statistics to provide for more satisfactory handling of all aspects of the meshblock areal referencing system will also be made shortly.)

I will conclude by a mention of the issue of confidentiality in relation to geocoding. This matter has been referred to more generally earlier in this paper and you will not be surprised to hear me say again that additional fine geographical coding of survey data cannot be allowed to lead to a relaxation of confidentiality standards. I believe, however, that any limitation that may have to be placed on individual meshblock tabular analyses of particular, sensitive variables should not be a serious inhibiting factor so far as legitimate information needs of regional statistics users are concerned. I have seen quite a few cases when a review of needs has led to a decision that an analysis at a higher level than meshblock is sufficient. In any case, a limitation that, in effect, could represent the difference between having no data or not should be accepted as a necessary one.

I look forward to a period of much closer co-operation with regional statistical users and an improvement from the central government side in the service provided. I would stress, also, that if this is to come to pass counterparting action from the regional side will be a necessary pre-condition.

Reference

- 1 Report of the Technical Committee on Statistics. N.D.C.20 Government Printer October 1969.
- 2 Report on Statistical Needs and Priorities made to Minister of Statistics, 1974. Unpublished but copies available on request to Department of Statistics.

Workshop Sessions

There were four workshop sessions during the seminar. Participants met in groups for the purposes of

- (a) defining planners' needs and experiences of models,
- (b) learning something about modelling practices,
- (c) discussing data sources and requirements, and
- (d) considering the prospects for urban models in N.Z.

Each group reported on their deliberations in respect of (a), (c) and (d) above and the following is a condensation of the views expressed. The topics covered in (b) are listed.

1. Planners' Needs and Experiences

The seminar participants met in six groups each with the following objectives:

- (a) to generate a list of purposes which urban models might fulfill in New Zealand;
- (b) to outline some of the desired attributes of urban models;
- (c) to state an order of priority for urban models;
- (d) to ascertain the extent and nature of experiences to date with urban models.

(a) **Purposes of models:** As might have been expected the purposes of models listed by the participants fall into categories indicative of activities forming part of the planning process as envisaged for example, by Reif (1973). (Figure 1)

Among the most often mentioned purposes were those related to increasing the planner's understanding of the urban system and allowing greater clarity in his thinking on topics such as interaction among land uses, community processes and neighbourhood activity patterns. Specific components of the urban system on which it was hoped models may throw more light were the current housing market, intraurban industrial location, home/work relationships, the location and functioning of education, transportation, communication and health facilities. Participants felt the need for models which would explore inter-relationships between these components, describe the nature of change, identify constraints and warn of consequent impacts.

A preference was also expressed for models which might help in the formulation of objectives and in the conception of planning problems.

Further scope for models was expected in the consideration of policies i.e. possible courses of action. Emphasis was given to the possibilities of using models to find optional physical arrangement of the elements of urban infrastructure and to optimising the pattern of community investment in urban development. The determination of policies for urban

growth in a region and for the location of open space and recreation were areas of particular concern.

A role was also seen for models in evaluation. In this the simple costing of alternative proposals was the first requirement with comparison of benefits desirable later. In this not just the total costs and benefits were of interest but also their incidence — "who pays and who loses?" Public sector activities, particularly the provision of infrastructure and urban renewal appeared to be areas needing attention with extension of techniques to cover urban alternatives in total being desirable.

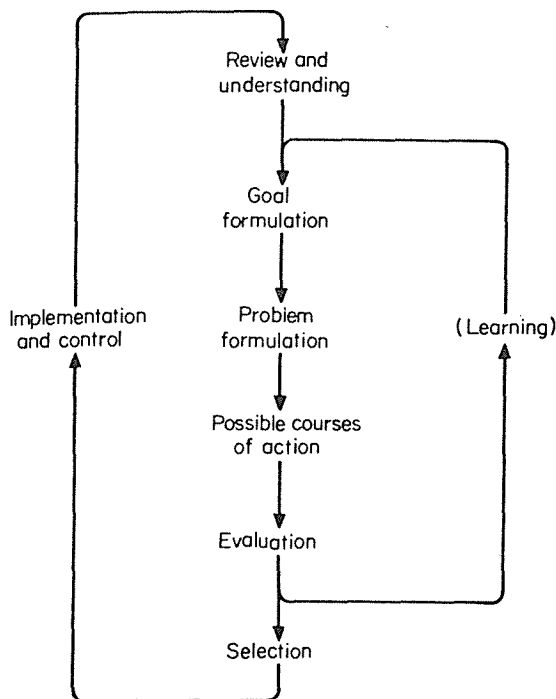


Figure 1 Planning as a cyclic process

Source: Reif, B(1973) **Models in Urban and Regional Planning**, Leonard Hill Books, Aylesbury, Bucks. p.44.

Finally decision-making, i.e. selection, appeared to participants as an area in which models could be useful. They were expected to promote objectivity, to quantify the bases of decisions and thus to supplement the largely political nature of decisions. Models were seen as communication devices which might enable better consideration of issues by technical staff, political decision-makers and interested members of a community.

In each of these areas of the planning process the first and foremost function of models was seen as providing an orderly framework for accumulating and organising information.

The need for useable information was the underlying theme of all the discussions.

(b) **Attributes of models:** In listing some of the desired characteristics of urban models the participants endorsed and added to the views expressed by Latham (1977) earlier in the seminar.

Models were preferred to be capable of quick and easy application and inexpensive to run. Again Latham's plea for models that could use easily available data was echoed.

Emphasis was given to the need to properly document models and their operation, to make the assumptions on which they were based clear and allow for their structure and workings to be visible, i.e. not a 'black box'.

Participants expressed a need for standard models which were flexible and adaptable to use in various combinations and to varying data formats. Ability to work with both large and small urban units, to be sensitive to variations occurring over short time-spans and to be generally time-oriented were also desired attributes of models. Above all relevancy to issues or tasks currently confronting planners was considered essential.

(c) **Priorities for urban models:** The workshop groups found it difficult to agree on any single set of priorities for models. There was some support for modelling oriented towards assisting decision-makers at the national level to balance competing demands for investment capital, but otherwise the general consensus was that quantification and measurement i.e. 'modelling' should take place on a broad front and in relation to a variety of planning problems.

(d) **Experience with urban models:** Although some of the participants had had no direct experience of modelling many had been involved in the several transportation studies conducted in New Zealand, described by Douglass and Smith (1977). Other experience included involvement in population projections, cost/benefit evaluation of engineering projects, a regional input/output economic model and some academic interest within the Universities. The most direct contact had been that with the Wellington Region Land Use Transportation Study and the current Manawatu urban growth study. With the addition of this latter current study the situation with regard to experience of modelling in New Zealand remained as described by Forster et al (1976).

2. Modelling practices

Registrants were invited to join the workshops which interested them for half an hour, i.e. each registrant was able to join three workshops.

The objective was to discuss some of the concepts and ideas behind some attempts which have been or are being made to use urban models in New Zealand.

Topics for discussion.

- i) A simple application of the gravity model, led by John Dare
- ii) The basic ideas of a Lowry model, led by Roger Dunn
- iii) The Manawatu project, led by a team from Ministry of Works, Head Office
- iv) A regional input-output model for Northland, led by Chris Moore
- v) The basic concepts of DYNAMO, led by Mervyn Rosser
- vi) A national simulation model using DYNAMO led by Des Clark

3. Data Sources and requirements

Once again the seminar divided into six groups. Each group pursued the following objectives:

- (a) to find out which data are likely to be used in urban modelling;
- (b) to establish the sources of the various data;
- (c) to define the particular requirements or desirable attributes of each data set.

(a) Data requirements

The following is a composite list of data requirements compiled from those produced by the groups. Items on the list are grouped according to categories, and represent data sets for any particular urban area under consideration.

- (i) Natural resources
 - topographical data
- (ii) Demographic
 - population, by age and sex
 - migration data
 - occupation and industries, at home and at workplace
 - household sizes and attributes, i.e. car ownership
- (iii) Development
 - land use data
 - floor space, use, age, condition
 - housing stocks
 - social facilities
- (iv) Urban infrastructure and its use
 - networks; water, drainage, energy, communications, travel
 - travel patterns; people, goods and costs
- (v) Economic indicators
 - land and building valuations
 - household income and expenditure
 - commercial and industrial income and expenditure
 - commodity flows and other linkages

(b) Sources of data

None of the groups entered into detail in listing sources of data. Generally known sources listed included:

- Government departments
- Regional and local authorities
- Individual researchers in universities and commercial establishments
- Publications of the Government Printing Office

A plea made by several groups was for a comprehensive catalogue of available data which could be kept up-to-date by some central agency.

In this regard, but clearly not giving the comprehensive coverage that seminar participants were requesting, the **Catalogues and Lists of Publications** available on request from the N.Z. Government Printing Office together with the **Planning Research Index** published annually by the Town and Country Planning Division, Ministry of Works and Development, indicate some of the likely sources of data. **News Bulletin No. 20**, "New Zealand Statistics" published by the Town and Country Planning Division, MOWD in March 1974 was compiled from **Catalogue of N.Z. Statistics 3rd Edition 1972**, published by the Department of Statistics and these also are of interest and value. Similar concerns have been shown by the National Research Advisory Council (NRAC) which convened several discussions in 1977. These are reported in **Social Science Workshop/Conference Proceedings, 20 May - 31 October, 1977**, published by NRAC P.O. Box 12240, Wellington.

As a first step towards some central data registry participants emphasised the need for organisations to maintain an index of their own data.

(c) **Requirements and attributes:** The main ones listed were:

- compatible locational coding
- consistent definition of classes e.g. land use coding
- disaggregation as far as possible
- dating of data
- compatibility with standard computer analysis packages eg. SPSS.
- definition of sample sizes and sampling frames where applicable.

Attention was drawn to the efforts of a representative group of officers from regional and local planning authorities to promote the availability of suitable planning related data. These are described in Report 77.23 entitled "Statistical Needs for Local and Regional Planning", dated 10 March 1977, circulated by the Director of Planning, Wellington Regional Planning Authority. This report set out desirable improvement to various available statistics and contained an Appendix setting out sources and limitations of local and regional planning data.

(Further progress in this area is expected as a result of most useful seminar convened in February 1978 at Wellington by the Government Statistician. — Evidence of recent progress at a regional level is given

by the Auckland Regional Planning Information Service, details of which are given elsewhere in this issue of TPQ)

3. Prospects for Models in New Zealand

The fourth workshop session was conducted in three groups in which each group was invited to make a contribution to a view of the prospects for models and to help answer the question "Where do we go from here?"

In reporting back the groups emphasised the potential role of modelling at various levels of planning, national, regional and local. Although the seminar had focussed on urban models the possibility of modelling in rural and maritime situations was recognised.

Future use of modelling was seen to depend firstly on a clear recognition of the issues involved and on some firm commitment to grapple with them. Given funding and the appropriate staff, the use of models and refinement of techniques would follow. Provided modelling efforts were justified by performance, further and increased commitment of resources could follow. The essential needs then were to co-ordinate available expertise and secure a practical orientation for creative effort. These endeavours were seen as calling for a co-operative and supportive inter-relationship between the model-makers, planners, policymakers, and possibly the public.

The next appropriate step to be taken was seen as the improved dissemination of existing knowledge. To this end workshop type discussions of existing models were needed to familiarise the uninitiated with the potential uses of models. A small group to act as a "spearhead" was thought desirable to gain a high level of expertise and be available to advise practising planners. In the first instance, and probably for some time it was thought it would not be appropriate to develop new models — available techniques should be 'got up and going' first.

M.A.T.

"A data processor is defined as a person who delivers the wrong product to the wrong person at the wrong time, in a technically outstanding manner."

— Eldon J. Williams, *Data Processing Director City of Eugene, USA, at BURISA seminar University of Warwick, July 1974.*

Rosemary's Problem

A question raised for many participants in the course of the Seminar was simply "how can models help me?" Ms Rosemary Brickell, a planning assistant with the Northcote Borough Council, one of Auckland's North Shore suburbs, voiced the query in that context, pointing out that Northcote was a small local authority completely surrounded by urban development and that current changes consisted of in-filling, consolidation and redevelopment rather than peripheral growth.

'Rosemary's Problem', as the question was dubbed, was responded to by members of a panel and the 'check-lists' produced and spoken to by Dr Mark Wigan and Mr Norman Fisher are reproduced below.

Rosemary's Problem on Urban Management

Mark Wigan

What can an Urban Models Perspective do to aid an Inner City, Fully Developed Residential District? Analysis of the stock

1. What is the distribution of housing stockages?
2. What is the age/life cycle distribution of residents?
3. What changes in prices have been observed?
4. What are the facilities (education, transport, sewerage, retail, parks) access like, and what utilisation (and quality) patterns at present and the past?
5. What are the live planning-related issues in the area?

Status of the planning objectives

1. Are there extant or possible major redevelopment **pressures**?
2. Are there extant or probable redevelopment policies emergent within the LGA?
3. Are there traffic or transport **operational** developments in train likely to impact the area?
4. Does the possibility exist of environmental protection measures? Are there local (resident, conservationist, LGA) organisations committed to these?
5. Are the servicing systems adequate for the area? Are they being called on to provide through-passage for **other** areas? Will they continue to be adequate? Are there pressures for altered standards? (this covers sewerage, access, water, power, visual amenity, etc)

Numerate monitoring issues

1. Consumption of power, water, retail sales, plan-

- ning variation applications
2. Household occupancy trends
3. Demographic (migration) rates
4. Ageing of cohorts of residents, and resource commitment patterns associated with life cycle
5. Socio-economic characteristics of the area and any changes in these.

Given a fully developed urban area, the following questions MUST be asked:

- Is it stable in terms of physical condition?
 - Is it stable in people characteristics?
 - Is it stable in terms of the wider requirements and trends in the urban environment?
 - What objectives are held by the residents of the area, and what expectation of change?
 - What is known of the choice, preference, and behaviour patterns of the residents w.r.t. public services and facilities?
 - What objectives are held by public authorities for the area?
 - What major actions are proposed by private bodies?
-

Rosemary's Problem on Urban Management

Norman Fisher

1. Background

The focus in urban planning and modelling has been primarily directed at expansion or new development. What approach should be taken to the planning/management of existing developed urban areas eg LGA within a large city or rural town? What is the scope for modelling in this approach?

2. Major Questions

- i) What are main characteristics of existing area and community?
- ii) What are recent/current major problems (policy issues)?
- iii) What are processes of change in area/community?
- iv) What changes are likely to occur in area/community over the next 5/10 years?
- v) Are these changes acceptable? That is are there excesses/inadequacies?
- vi) What instruments are available to LG to achieve a more satisfactory result?
- vii) What is likely to be availability of final resources to LG, and possible demands for those funds?

3. Major Steps

- i) Take stock of area/community
- ii) Forecast changes in area/community

- iii) Identify objectives — doing or stopping something
- iv) Identify and implement instruments
- v) Establish monitoring system

4. Scope of Stocktake and/or Monitoring

- a) Public facilities
e.g. transport/communication
water/sewerage/drainage
education
health
security (police, fire services)
- b) Private facilities
e.g. shops
offices
factories
- c) Personal facilities
Housing (type, tenure, age, size, services, condition, price/rent/value, turnover)
- d) Population characteristics
age/sex
marital status/household status
ethnicity
- e) Activity patterns
- f) Community Wellbeing
 - social
 - education
 - health
 - crime
 - sport/recreation
 - environmental
 - air
 - water
 - noise
 - economic — jobs available
mobility/accessibility

5. Scope for Models

Demographic forecasting. Traffic simulation. Accessibility.

"... it is not hard to imagine a reasonable man's refusal to participate in such a probable boondoggle."

"... better to try something — anything — than to merely ring one's hands over the futility of it all."

"... the process of model building is educational. The participants invariably find their perceptions sharpened, their horizons expanded, their professional fields augmented." — Ira S. Lowry, in "A Short Course in Model Design", *Journal of the American Institute of Planners*, May 1965.

**Overviews:
impressions of the seminar from three participants**

Norman Fisher

I wish to fill the ten minutes allotted by quickly touching on three things, the main themes of the seminar, the responsibilities of government, and the steps now needed to make certain that the seminar is a continuing success.

Themes of the seminar

As far as the themes are concerned, any view must always be idiosyncratic because we do not tune into every discussion, and we interpret people's comments and views differently. I have written down five points, some of which very much relate to my own paper. One of the reassuring things in some senses has been to find that the sorts of things that I thought were relevant to modelling and urban issues from my Australian background seem to be reinforced in discussions here.

It seemed to me that one of the major themes coming out of the seminar was that we are talking really not so much about planning in the old way, but about **management of change**. And that means that whilst we are acknowledging there will probably be some modest expansion of our urban areas, the focus will be very much on managing change, both on the margins but also within them.

At this last minute some parcels have arrived from the airport and I do now have copies of the papers that I keep referring to. There is part of the one by John Mant, from South Australia, I would like to read as quickly as I can:

"The economic and social events of the last few years have caused us to reconsider that view of planning which arose from the optimistic 1950's and 1960's. Rapid changes in the nature of Western style economies, demographic changes in particular changes in the nature of households, have lead to a questioning as to whether western cities will continue to develop along the lines of some trend which existed in the past two decades, or whether, indeed, history will come to judge them as historical aberrations briefly occurring during a time of economic disequilibrium. Previous planning practice has chosen a single view of a period some time in the future and presented it as an end-state plan for a metropolitan area. This method of planning cannot cope with substantial and rapid shifts in economic and social forces, and a number of major strategic plans which appeared in the last decade are now quite inappropriate for the situations which now exist."¹ The paper then goes on to talk about how, having recognised the failings of statutory planning approach, we need to focus in on urban management questions which

are ultimately resource allocation questions and are therefore an essential part of the normal political processes. Now that's about management.

The second theme that I have discerned is quite a willingness to become **issue oriented**. People are prepared to try and identify what are going to be the critical issues, and focus in on those rather than focus in on models, and try then to chase around and find uses.

There seems to be an increasing awareness, third point, about the importance of other instruments in the **public sector** by which governments can influence change. Surprisingly, given the nature of the subject, there was very little discussion about statutory planning. I perhaps in my own references to zoning probably mentioned the word as much as anybody else in the seminar work groups, so it was quite unusual not to be talking about the traditional weapon for control in development.

A couple of the people who have already spoken mentioned the **changes in time frame** and again there seems to be no real challenge to the idea that our focus has moved down in time much more than perhaps we would have even thought was possible ten, or even five, years ago.

Now my last point about themes is a matter of omission. Although Mark has said, and I think people have generally accepted, that we should be looking at the various models that are available and tracing them through to see whether the logic is appropriate to our problems (I am talking about both sides of the Tasman) there was no real discussion and **no real interest in developing new models**. I think that is probably, on balance, a correct judgment. There may be areas where there are gaps but generally what is already available can be adapted to our needs. And that is quite appropriate for our countries, and especially New Zealand, having regard to scale and scarce resources. We are not in the game, in this very highly technical sophisticated area of the sciences, of developing new technology in the modern sense. I think we should be quite happy to accept that implicit conclusion in all our discussions.

Government responsibilities

Whilst I don't necessarily challenge the view that central government may do some sorts of modelling, that is, actually apply models in certain areas (and I would hope that they would continue to do so) I have always looked on the role of national governments, certainly in my country and I think here, as being very much a 'facilitator'. In so far as there is better practise in one place than another, the task is partly to encourage its transmission by circulation elsewhere. There is a software-type job for central governments in making certain that the best practise doesn't stick in any one place. That may be more a problem in Australia because of distances but I did feel that this seminar served an extremely useful function in giv-

ing people an opportunity in talking together professionally, about some of these problems in a way that perhaps hadn't occurred before. That is not necessarily a reflection on people in Wellington but it may be that if there is going to be successful use of models, in even a modest scale, in this country it will very much depend on people in Wellington being willing to help pass the information around.

I would have thought that if there are going to be modelling applications in New Zealand they are more likely to be occurring at regional level. I don't rule out the possibility, having talked to Rosemary's problem this morning, that there will be some scope for using models in local areas. But I think that is some distance away. Modelling is expensive, often of human resources or professional skills, when at local government level you are probably short of good professionals, and probably you are still trying to get your decision-makers to be willing to listen to even fairly modest numerical analyses, much less very sophisticated models. I would have thought that local governments in this country, like ours, are much more likely to be making use of the results of modelling at regional levels and perhaps, as time progresses, being willing to try and see if there is some scope for some modest modelling for themselves but that is probably distant.

The next steps to be taken

How can we make certain that the seminar is a success, not only the context of three days, but for the future? I've enjoyed the seminar, and I do get the impression that it has created a lot of momentum about a new approach to the problems of your cities. But my experience in Australia, with a seminar not too different from this, is unless you make some conscious decision very soon after the seminar to establish a process by which the thing keeps going it will 'disappear into the sands', or whatever is the appropriate local metaphor. I think one group commented about another meeting and that strikes me as a useful sort of a suggestion, perhaps towards the end of 1978. Somebody, in government, or university or the professions, should think about having another meeting just to review in fact where you have got to. That need not be a full three day seminar, it might in fact just be a single day. That might be just sufficient to make certain that people are thinking about what they are doing in modelling and have something to aim for in the sense of talking about it or putting something on paper.

The list of Models that Mark gave in response to the request to describe models that could be used on the Hibiscus Coast verses Albany problem looked pretty daunting to me.

I don't know how many of those models are available in New Zealand and I am not certain, once the seminar is over, how you are going to find out, if they are available and whether they are actually opera-

tional and who knows about them. It struck me that a modest 'clearing-house' might be a useful means that people might use to find out if the model exists, to find out if somebody has used it, and to find out how to use it properly.

The third point is that at some stage I think that you should be trying to broaden the interest in the matters we have been discussing. Although I haven't felt too lonely I do get the feeling that some of my economist colleagues from the New Zealand scene could have learnt a lot by being here and participating in the discussion. I am not certain how many people are here, say, from the water and sewage side of government, or from housing, but our discussion has been much broader than I think has been the representation. Although I think it has been a fairly heterogeneous group I suspect that there are other people who could usefully learn something, perhaps even contribute something.

And finally, all of our improvements and techniques as professionals on how we analyse situations and how we simulate it or forecast it will go for nought, if we cannot make our governments, by that I mean elected representatives a bit more thoughtful, or a bit more receptive to our increased information flow. And therefore I think at some stage somebody needs to give a paper to the local government conference, or whatever is the equivalent meeting of local government elected people. When is somebody going to be starting to get something into the popular press to start the change, the general community attitudes as to what professionals in urban management and urban planning do? Professionals are usually a bit hesitant about trying to change the political environment in which they survive or in which they work. I'm not suggesting that you need to join political parties or to take political positions. I see no problem and no reason why professionals should not try and educate the people for whom they work. You would probably not want to do it directly but I am certain that local government elected people in my country, through some of their meetings and associations, would be interested in a paper which teased out some of the developments in the professional areas, which they oversee, and would probably appreciate the opportunity to contribute some thoughts of their own so that it would be a two-way flow.

As I said, these impressions are fairly idiosyncratic. It would think that whilst the seminar is 100% success at this stage, it could be only a 25% success if there is not some thought and action taken to maintain interest.

Mark Wigan

The purpose of the seminar was putatively to consider models and quantitative methods for urban environments. As usual when you get a group of people together, because you put one particular banner into the air you are often very surprised who ends up following it. I think, just as Norman does, that the heterogeneity of the response has been extremely helpful. I'm not sure what individuals might have got out of this meeting but certainly, from having dealt with similarly broad groups in the past, I feel very heartened by the number of comments which were not of the same flavour in the last day as they were in the first.

There are several different measures of success and I think the one I would like to concentrate on, having heard the supremely practical, is the supreme academic, and to say that the only really lasting changes are the changes in viewpoint. I think that we have had some of those and just sufficient material to provide grounds for perhaps moving further.

I hope Norman is right in reading in a momentum because you do need it. I'm afraid that I can't give you the great wave of supported enthusiasm as how successful you are going to be in five minutes and how easy it is going to be to get there; it isn't. But I can reassure you that if you don't do it you will regret it.

During the seminar I asked a few questions such as, "How much does it cost to develop here rather than there?" I got some interesting non-answers. You are going to hear those questions posed to you again before long, and they are going to be posed to you in those same rather simple terms. And only at the first round are you going to find them very easy to answer without doing some homework. You have some lead time at the moment — if you don't use it I will be sorry for you, but not sympathetic. If you do use it I will be as sympathetic and as constructive as I am able from a distance. The Road Research Unit's initial sponsorship of the Urban Models report provided a good environment in which to try to take the next hesitant step.

So I would like to reinforce the point that you had better have another meeting, and you had better set some targets for it fairly shortly. I think the next meeting might reasonably have a particular flavour. I have here some of the proceedings, very nearly completed and ready for publication in the next couple of weeks, of the tutorial-oriented workshop that I ran in Melbourne, with the co-operation of the Bureau of Transport Economics.

We put together a working workshop aimed at middle management level; people having lost touch with models, and some of those who wished they had; and we made sure it was a broad coverage. We made sure that some of the tools of the trade were 'up' on the local computer, that operating manuals

were to hand, that results of actual runs were there, that people who used the models were there, that at least one of the models was sitting up on a machine that people could go and turn the knobs on.

Such a tutorial workshop could reasonably take in several different categories of models, work through them and particular applications and examples, provide a few knobs to twiddle, in short make them accessible. Don't underestimate the amount of effort it will take. Leave at least four or five months to develop it — you'll need it. But then you will have, if you spend the extra, singularly energetic effort required to finish the job, a resource that you may draw upon. You will be critical of it, inevitably you will say it's selective, it doesn't do the whole job, but it will bring the basic material together, allow discussion by all the staff and people who come in contact, and put some potential tools in their hands.

You may be interested in a project that we have going at the A.R.R.B. It is a very simple one — it just says "get hold of the land use and urban development models that have been used around the world and that are available; get hold of computer tapes; get hold of the user manuals; get hold of application papers, set them up and see if they're really there."

That task is well under way; much of the material is set down, and when the results are there I will undertake to make sure that the Town Planning Department of this University is supplied with the reports that may come from that project. It will be another tool — just another tool, but I think you are ready to use it.

But you will have to build your own tools for your own problems. I can't emphasize this too strongly, I've said it several times, but it's one of the truths nobody wants to hear — calibrating a model for your own purposes is quite close to re-building it in your own mind. If you think you will pick up a model and use it, give me due warning. I want to start sprinting. You will hang yourself with your own rope. You really will. You need continuity, you need people. You've got people capable of doing the work. But how do you put them in a position where they can consolidate and develop their expertise, make it accessible and use it?

They too need continuity, they need access to information and access to certain types of resources, and the only known way of storing intellectual resources is on computers. Everybody says "let's find a way of keeping it off the computer." I'm sorry, but you're not going to be able to do that. Recognise the advantages of the computer. Store your know-how on the computer — then it is accessible to you all.

The Royal Institute of Public Administration in Britain had the identical problem which they referred to as 'operational research for local government'. They set up a small organisation, the staff appointed by secondment for a short time, and consisting in the main of operational research analysts. They spent a

fair amount of time getting familiar with all sorts of local government problems where a simple numerative approach was appropriate. They found that the use of these simple approaches produced very beneficial cost benefit returns in very short order, and provided the confidence and the mutual collection of sensible judgements and understanding which underlay the next round of longer term work. They also put them into operational form, sufficiently operational to actually sell them, and provide back-up servicing. That little step is often left out, but the models with support are the ones you can trust. But you can only do it with continuity. So somehow you've got to build an umbrella beneath which expertise can be built up, and an organisation able to provide a service can grow.

I would suggest, and I would invite you to consider, the possibility of picking off a few people and giving them an opportunity either under a university umbrella or a joint governmental organisation perhaps with only a short term life. Give them access to the necessary resources and tell them, "get on with it — you're in the local government operations analysis business."

If they do it right they will pay for themselves, very fast. By doing that they will build up that continuing confidence which is so essential to apply this kind of modelling expertise. Give it a try.

I've spoken to most of the people here in different ways. I've found this a most instructive seminar. I'm fairly sure that neither Norman nor I have said the things we were expected to say, but then that doesn't particularly matter — your responses weren't quite the responses we expected either. Thank you.

John Foster

I will make a few remarks on my impression of this seminar. I feel that most people who came along received an unexpected result, and that they got a much wider definition of the word "model" than they had in their minds when they came. I think I can detect, a double response to this. On the one hand there has been a sort of a disappointment, that this has produced too wide a scene to be capable of sensible resolution. If we use a single word like 'model' to cover the whole range of things that have been described here ranging from a simple graph on the blackboard, to a diagram that represents the possibility of hooking about 16 models together then I wonder whether we are capable of coming to any sensible resolution about such a disparative thing.

The second response, though, was that we might go on hiding in our small, relatively, distant place at the bottom of the Pacific, with a conscious, acceptance that large complex information hungry approaches are not relevant in our scene. What I want to say, if they have been your own responses, is that you should reflect on them, because I think they are

initial gut reactions and they may not be reliable. When we decide on what we are going to do in New Zealand we should be a little bit deeper in thought than just those initial gut reactions we've had here — if I am correct in interpreting what they were.

The other point I wish to make is to take up one that Norman made, and that is to say that we will always, in this country, have an adaptive rather than an inventive or innovative technology. We just don't have the resources. Our technology must be based on the understanding that we take something that somebody else has done and we adapt it to our use.

If we think we are a modern society, albeit small, with a small resource base, and we want to be competitive, we can't afford to respond by saying "we're going to have all of these models and use them a little bit." What we've got to do is make a conscious decision, select a small group, maybe even one, and really work it. That's what we've got to seriously think about. And I don't think many people have started to address that problem.

I would like to finish by saying, or giving some sort of background to the people here about how Road Research Unit has got involved in this area and my impressions as to why it has done so. I think the committee involved is probably going to have quite a different viewpoint after this seminar than it had before as one or two members are present.

Well, let's be straightforward, urban models or urban development issues, urban management issues, call them what you will, are relatively peripheral to the operations of the organisation that employs me — the National Roads Board. It is prepared to commit some resources — it has already done so. We are proposing, if we can get a lead from this seminar, to go further.

But the total effort which we need now, just to catch up, is going to have to be a co-operative exercise of which my organisation supplies something of the order of ten or fifteen per cent of the effort. And local government is just going to have to get off its collective seat and do something. I think that you should consider very seriously the suggestion that Mark made. And that you should take the initiative along those lines. I can't see that it's a feasible proposition for central government to take that initiative. You guys have got to help yourselves. You can't rely on Big Daddy in Wellington.

When we selected this university to do the initial research exercise we did so, not so much on the view that we thought that they would produce the best result, but certainly, in my mind, on the view that this is the proper place for this body of expertise to reside, this university having schools of engineering, and architecture, and town planning. Now quite frankly I've been disappointed, and it might be that we should now cut our losses and conclude that the university is not really interested in this, and we should set up an organisation along the lines de-

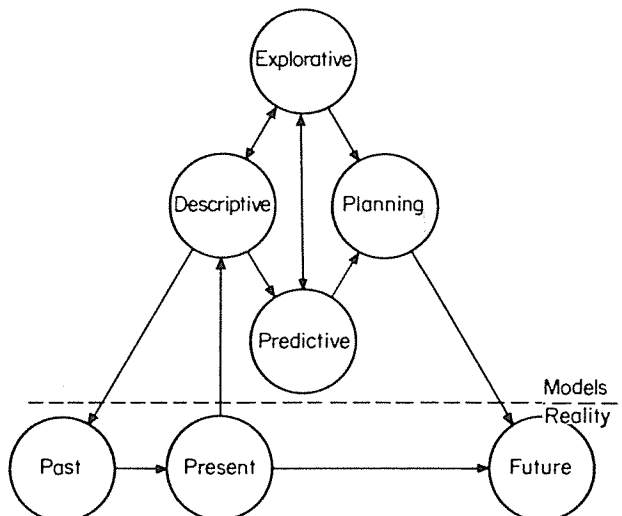
scribed by Mark Wigan. I would like you to think about that and to reflect on those sorts of issues. But even if we do decide, to set up a new organisation rather than rely on one that's already there, that is not going to be sufficient. You've just got to get in and try — there's no other way. And as Mark has told you, you're going to make a lot of mistakes. But I don't really think that we can afford to sit down and wait for something to happen, for some vague body to be set up or some department unspecified in Wellington to make sure the thing carries on. It's got to be by our own efforts.

The other point that I would like to leave you with is that I am concerned, very seriously, with a lack of what I consider to be proper professional response to the issues facing this country at this time.

I think we've seriously got to think just where the engineering and planning professions are and what relevance they do have. Whatever stance you may take on that issue, there's one thing clear in my mind — if we don't get into these sorts of activities that we've been talking about people may find that two professions can be readily done away with. Thank you.

Reference:

1. Mant, J.H., **Changing Urban Administration and Policy: South Australia**, UNESCO Seminar on Urban Management Processes, Raywood, near Adelaide, August, 1977.



Ideal process of model making in relation to the reality

Source: Echenique, M. 'Models: a discussion', **Land Use and Built Form Studies**, W.P.6, March 1968.

Book Review

Auckland Region Joint Study Group, Auckland: the costs of growth: a survey and analysis of proposed works and services in the Auckland Region, Auckland, September 1977

Auckland: The Costs of Growth presents a survey and analysis of proposals for expenditures on capital works in the Auckland region during 1977/8 to 1981/2. However, the report extends well beyond a number-crunching exercise surrounding future financial requirements to encompass a discussion of current shortcomings in the planning, allocation and investment procedures which are used to make investment decisions.

Authored by a group of officers from the Ministry of Works and Development and the Auckland Regional Authority, its publication is timely in light of the reviews which are underway of the regional planning scheme and several district planning schemes. It underscores the need for a more coordinated strategy for urban development in the region which can obtain the needed commitment from both central and local governments.

Terms of Reference

The agreed terms of reference were:

1. To assess the public expenditure necessary to provide government and local authority works and services planned to support the development of the Auckland region over the next five years;
2. To assess the availability of finance, labour and materials required to meet commitments, and the relation between private and public investment;
3. To propose a set of regional priorities for public expenditure on capital works and services for the next five years taking into account the Growth Alternative Study and the regional review.

Subsequently, the study group restricted their efforts on the second term of reference to an assessment of the availability of finance. In setting regional priorities attention was directed to functional investment priorities rather than individual works priorities. Completion of the detailed surveys of investment plans by many governmental units coupled with the broadening of the enquiry into other areas led to an 18 month period between the time the study was proposed and formal release of the document on 9th December 1977. The benefits of the exercise must inevitably be judged in terms of the report's ability to forge a consensus on development strategies and facilitate the gathering of an adequate financial commitment to convert the plans into reality.

This review will concentrate on four key aspects of the report: (1) Past and projected future investment in capital works; (2) Projected resource availability;

- (3) Proposed investment intentions for particular functions; and (4) Shortcomings regarding planning, allocation and investment procedures.

Past and Future Trends in Capital Expenditure

The report studies trends in capital expenditure during 1966-76 by territorial, ad hoc authorities, the ARA and central government. To facilitate comparisons, expenditures are expressed both in "nominal" and in "real" terms, the latter removing the effects of price changes by reporting expenditures for all years in constant June 1976 prices. Trends show that total real capital expenditure has continued to rise steadily over the period; however, expenditures per head have fallen. During 1966/7 the region's investment in capital works amounted to \$164 per capita, falling to its lowest point of \$120 in 1971/2, and rising to \$146 during 1975/6.

Expenditures are disaggregated into ten groupings and exhibit varied trends. Particularly prominent has been the falling per capita investment in roading and hospitals, the small expenditure on public transport and the large commitments in the areas of water supply and drainage/sewerage. Real expenditures per capita during 1971-76 by regional and local governments in the region have been roughly similar. In 1971/2 total regional and local per capita real expenditures were \$120.27, and central government's expenditure was \$116.94, while in 1975/76 the regional/local component was \$146.26 and central government expenditures were \$135.29.

The forecasts of investment intentions are based on survey information which was collected from local authorities, central government and the ARA. Information covering 2300 activities (i.e., projects or stages of projects) were collected for analysis, with capital work being classified as "committed", "approved" or "proposed". A number of difficulties with the information received make it essential that great care be exercised in making use of these projections.

The survey results showed that expenditure patterns over the five year period exhibited a traditional "bow-wave" pattern, reflected in high expenditures in the initial years which peak in the middle of the period and then fall away, often to levels below that in the initial period. The bunching of projects in the first few years in part reflects the backlog of projects which most authorities have experienced as a result of a reduced rate of public sector capital formation. Low expenditure in the final years may reflect their great uncertainty as well as an expectation that projects programmed for earlier years will be postponed and shifted into later years.

Because of pressures to contain capital expenditure in the public sector, surveys of investment plans have tended to become "wish-lists" rather than statements of intended investments based on realistic expectations regarding expenditure levels. Sur-

TABLE 1

Real Per Capita Capital Expenditure (June 1976 prices)				
Local Authorities			Government	
Actual expenditure	1971/2	\$120.27	\$116.94	
	1972/3	120.70	128.22	
	1973/4	129.05	118.21	
	1974/5	140.83	127.96	
	1975/6	146.26	135.29	
Surveyed expenditure	1976/7	140.71	Excluding Thermal No. 1 Power Station	Including Thermal No. 1 Power Station
	1977/8	178.40	98.15	98.15
	1978/9	192.00	102.00	107.25
	1979/80	192.59	121.20	156.08
	1980/81	188.47	119.11	232.99
	1981/82	150.04	114.76	245.79
			101.38	244.44

veys reveal that central government agency projections of expenditure levels are consistent with government's current emphasis on reducing public sector spending. However, as similar restraint is not shown in local authority estimates, the forecasts of real capital expenditures per capita (Table 1) appear somewhat unconvincing. The inclusion of the Thermal No. 1 power station in the estimates of government capital expenditure pushes up the projections of government expenditure well above previous trends.

The divergence which is forecast between central and local authority expenditures per capita seems unlikely both in light of their traditionally similar levels and the prominent role which central government plays in influencing the level of capital expenditures which local authorities can achieve. This influence is exerted through the various schemes for giving financial assistance in the form of grants and subsidies and through the tight controls which they exert on the market for loan money. The optimism of the local authorities is also shown in their expectation that the loan content of their capital expenditures will be on average 68.0% of total funds required, a figure high in relation to the average loan content of 61.1% between 1971/2 and 1976/7. Authorities projected that the share of loan money received from the National Provident Fund would be in excess of 60% which may also be high. This share has dipped from 61.3% in 1976 to 56.4% in 1977 (based on first three quarters), reflecting in part the ability of the higher interest rates on local authority stock to attract a larger contribution from private investors.

Projected Loan Money Availability

Projections of the availability of loan money to the
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Auckland region are made in Chapter 5 of the report. A range of alternative growth rates of gross national product (GNP) are assumed (2%, 0%, +2% and +4%) and then forecasts are made of the loan money available at the national and the Auckland regional levels. The group's best guess is the optimistic forecast that things will get steadily better with the economy's growth rates moving from 0.5% (1978) to 1% (1979) to 2% (1980) to 3% (1981) and finally to 4% (1982).

The reader is left somewhat bewildered as to how the estimates were obtained, as the techniques and assumptions are not fully explained. In fact, a least squares regression was done on ten years of data to calculate the relationship between loan money availability and GNP. A trend variable was included in the equation and forecasts of loan money availability were derived from the forecasts of GNP. Projections based on this equation result in a greater stability in the relationship between loan availability and GNP than has been the case in recent years. Projections show that loan money (for the local authority sector) as a percentage of GNP varying between 1.70 and 1.71; however, during 1972-77 this percentage varied between 1.45 and 1.80. Similarly, the forecasts predict that Auckland's share of total loan money (over the range of growth rates considered) varies between 29.9% and 30.7%, a narrow range in light of the actual range experienced between 1972-77 of 22.6% to 30.5%.

Estimates of loan money availability are then compared with the survey information obtained from authorities to predict the likely shortfall of loan money. However, because estimates of the supply of loan money are based on actual experience while demands for loan money have been based on the "wish-lists" supplied by local authorities, there is a

built-in upward bias in the projections of shortfalls.

Review of Investment Intentions

The study group reviewed capital investment plans in a variety of different functional areas and recommended those where savings could be achieved or where the postponement of work would not jeopardize long term development prospects. The group also tried to examine the public sector costs associated with different urban development strategies. Unfortunately, survey returns reported development expenditures which represented only a fraction of the costs associated with these proposals. The total costs of future urbanisation appeared to be impossible to discern and agencies showed little consideration or understanding of the important links between physical and social aspects of development.

Shortcomings of Planning Procedures

Perhaps one of the most useful aspects of the report concerns the discussion of the serious shortcomings in procedures for the programming, and allocation of funds for capital works. The fact remains that existing institutional arrangements ensure neither that a coordinated strategy for regional development will evolve nor that once such a strategy is determined, funds will allow it to be implemented. In such an environment, the planning process (and indeed the resources utilized for studies such as this) are called into question. It is disappointing that the study group did not take the opportunity to outline alternatives for reform and make stronger recommendations concerning the changes which they think are required. Such changes currently inhibit the planning process from making a greater contribution toward the more efficient utilisation of resources.

It is difficult to determine the exact audience for which the document was intended. In some cases it appears to be speaking to interested members of the public, yet it pays insufficient attention to the consideration of different options to be labelled a discussion document.

A report treats a number of wider issues which are of considerable interest and warrant further investigation and discussion throughout the region. These include:

1. **A development strategy.** The study group seems to favour a strategy which would direct further growth into these areas where capacity is already available so that minimal additional capital expenditure will be required. However, in recognition of the fact that **all** costs and benefits of alternative strategies need to be considered, this conclusion appears to give inadequate weight to the private costs and benefits and social (non-market) costs and benefits of the alternative options.

An example of the preoccupation with the public sector effects of alternatives is illustrated by the report's comments on expenditure on power reticu-

lation:

'The present situation, where a large number of sections have been reticulated on demand but are still vacant, could be criticised on the grounds that a large capital investment is lying idle (i.e., non-revenue earning), and these funds could be put to better use elsewhere. However, approximately 70 percent of the cost of this work is financed directly by subdividers and developers and had it not been invested in this way it is unlikely to have been invested in competing loan issues. It is therefore not depriving the loan market of substantial monies for other services (p. 124).'

2. **Better matching of job locations and the labour force.** The report raises the issue of an imbalance between an individual's place of residence and place of work. While journeys to work make a substantial contribution to the transportation requirements of Aucklanders, one cannot conclude that minimising journeys to work will achieve large gains in efficiency. Proximity to place of work is not the primary influence on residential location preferences. Industries must often locate near the source of raw materials, or the markets they serve, or near ports or other transportation links. Savings achieved by these locations may swamp those which could be achieved by relocating the plant in closer proximity to its work force. If we accept the concept of agglomeration economics for firms (particularly urbanisation economies) then further work study is required to determine whether it is desirable to further disperse the location of employment in the metropolitan area.

3. **The financing of urban developments.** The study group examined the problems of obtaining an adequate amount of finance for local authorities and suggested that some emphasis could be placed on increasing revenue from service charges. This raises the important issue as to the role of the 'user pays' principle in assigning the financial liability for local authority services.

In the area of urban development there has been a gradual shifting of financial responsibility for providing infrastructure from local authorities to developers (and then to purchasers in the form of higher costs). Previously the community would finance the incoming migrant, who in turn would finance others at some later stage. Current practices which shift the burden onto individuals do little to reduce the total costs of such development. In fact, it can be argued that this has encouraged local authorities to constantly upgrade standards for urban subdivision, free of the burden of having to meet the financial consequences from local authority revenues.

Perhaps this shifting of the burden has obscured the high public and private costs of government which the region now bears as the price tag for its extravagant form of urban development.

Claudia D. Scott

Urban Models Seminar

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