ROBUSTNESS IN PRACTICE - THE REGIONAL PLANNING OF HEALTH SERVICES

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Abstract

Earlier work has criticised the dominant tendencies in operational research contributions to health services planning as characterised by optimisation, data hunger, depoliticisation, hierarchy and inflexibility. This paper describes an effort which attempted to avoid at least some of these pitfalls. The project was to construct a planning system for a regional health council in Ontario, Canada, which would take account of the possible alternative future states of the health care system's environment and would aim to keep options for future development open. The planning system devised is described in the paper. It is based on robustness analysis, which evaluates alternative initial action sets in terms of the useful flexibility they preserve. Other features include the explicit incorporation of pressures for change generated outside the health care system, and a satisfying approach to the identification of both initial action sets and alternative future configurations of the health care system. It was found possible to borrow and radically 're-use' techniques or formulations from the mainstream of O.R. contributions. Thus the 'reference projection' method was used to identify inadequacies in performance which future health care system configurations must repair. And Delphi analysis, normally a method for generating consensus, was used in conjunction with cluster analysis of responses to generate meaningfully different alternative futures.

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1. INTRODUCTION

Robustness analysis[1] provides a method for strategic planning aimed at the preservation of potentially fruitful future decision options. It does so by treating planning as a sequential decision-making process, and by analysing candidate initial action sets in terms of their compatibility with attainable system configurations which appear likely on present information to perform satisfactorily over a range of anticipated longer-term system environments. Initial action sets are preferred, other things being equal, which keep open a larger number of these future decision options, and so maintain a wider span of strategic flexibility. The approach may be appropriate where there is a high level of uncertainty about future environmental conditions, about the decisions to be made by related agencies which will affect the future performance of the system, or about how alternative system configurations or performance will be evaluated in the future[2].

In this paper we report a case study of the application of robustness analysis - indeed, of an extended robustness methodology - to the regional planning of services. It has been suggested elsewhere by one of the authors (Rosenhead 1978) that the traditional methodology of operational research when applied to problems of health services planning has the following, often inappropriate characteristics :

(1) Problems are formulated as static, in the sense that they are to be solved in toto at one point in time. Attempts are made to abolish the uncertainty in the problem environment, rather than accept it as a defining characteristic.

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1 Robustness analysis is described in more detail in Rosenhead et al. 1972, and in Rosenhead 1980.

2 These categories of uncertainty are drawn from Friend and Jessop 1969.

(2) Problems are formulated in terms of single objectives, or several objectives are transformed into a single objective. This objective is there to be "optimised".

(3) Models are developed which depend on the wholesale quantification of aspects of the social world. This can lead to problems of distortion, or of implausible demands on data availability or credibility.

(4) Problems are formulated as if there were a single decision-maker, with recommended actions to be deduced rationally from his or her objectives.

(5) Project definition and execution are devoid of political content, reinforcing the "scientisation" of political debate. Where conflicting objectives are recognised, they are speedily "resolved".

To avoid these features, it was proposed, planners should prize approaches with the converse qualities; that is, methods which

(1) accept uncertainty and try to keep options open;

(2) reject optimisation in favour of co-ordination;

(3) make reduced demands on data;

(4) are not restricted to hierarchical deduction, but facilitate participation;

(5) do not attempt a technocratic abolition of politics.

In this paper we analyse the extent to which it was possible to realise these aspirations in the work carried out for and by the Ottawa-Carleton Regional District Health Council.

2. THE CONTEXT OF THE STUDY

The initial development work which we describe in Sections 3 and 4 below was carried out over a period of approximately 22 months from the autumn of 1977 to the summer of 1979. This was followed by five years' application of the methodology which was developed. During the development phase,the individual authors were retained by the Ottawa-Carleton Regional District Health Council as consultants in various capacities, both to advise on the development of a methodology for health services planning within the region and to direct the actual planning work. In the remainder of this section, we provide an overview of the organisational and planning context within which the work occurred.

In Canada, responsibility for the public regulation and provision of health services is vested largely in the provincial governments, which have introduced a variety of legislative and regulatory mechanisms to administer the national health insurance scheme as well as to influence the local provision of health services. Until very recently, however, there have been few attempts to plan and co-ordinate systematically the regional development of health services in a way which would be familiar, for example, to planners working within the British National Health Service.

As a part of an initiative to develop more systematic approaches to health services planning at the regional level, the Ontario provincial cabinet provided funds, beginning in 1974, for local health planning agencies. These agencies, called District Health Councils (DHCs), are mandated as advisory bodies with responsibility to recommend to the Provincial Minister of Health "actions which in the Councils' views are required to maintain integrated and comprehensive health services within their communities" (O-CRDHC 1979). However, DHCs have no authority independently to implement those recommendations; instead, they seek Ministerial support to encourage local providers to undertake actions which Councils deem appropriate.

This provincial initiative enabled communities to organise DHCs on a voluntary basis, and by 1979 22 Councils had been established, each covering a

region within the province varying in population from as little as 20,000 to more than 500,000. The Ottawa-Carleton Regional District Health Council (O-CRDHC) was the first to be established in Ontario. In 1977, when the current project began, Ottawa-Carleton was the largest DHC, having responsibility for overseeing the health care of 11 municipalities with a population of 535,000.

Like all DHCs, Ottawa-Carleton consists of a council made up of volunteers from the community who represent consumers, health care providers and local government. The Council is supported by a small full-time staff financed by provincial funds. The primary role of the staff is to provide the Council with that information and professional advice deemed necessary to support its decision-taking and policy functions.

Because of its experience as the first DHC, Ottawa-Carleton sought to have its role broadened to include a 'demonstration', path-breaking, planning function. Specifically, additional funds of approximately 200,000 pounds were provided jointly by the Ministry of Health and the Ottawa-Carleton regional government to support a professional planning team. The team's responsibility was to undertake a two-year Planning Program intended to help the Council "plan for the availability of integrated, comprehensive health services in the region" (O-CRDHC 1979). At the proposal stage, the Program had been seen as producing a 20 year comprehensive master plan for the Region's health services development. However, as a result of a 4 month period of "planning planning", involving discussions between permanent staff, team members, the consultants and Council members, the objectives of the Planning Program were altered significantly, and the team then developed a detailed methodology which was consonant with the new objectives. The objectives which emerged to guide the work of the Program included the following :

"- to develop a strategy for planning health services over the long term (the strategy will comprise guidelines, procedures and policies which will assist and inform Council in its decision-making);

- to employ the strategic guidelines, procedures and policies to produce operational plans (operational plans will establish short and medium-term actions to strengthen and improve delivery of health services); ...
- to begin a program to assist the continuous monitoring and evaluation of the health care organisation in Ottawa-Carleton"

(O-CRDHC 1979).

The conception of the Planning Program which emerged from the early deliberations reflects the not inconsiderable experience of Council members in dealing with local health problems as well as the insights of the team recruited to implement the Program. Indeed, to provide a clearer impression of this aspect of the background to our own study, it is useful to cite a key passage from one of the early working papers prepared by the O-CRDHC planning team, to explain the methodology which had been adopted :

"The essence of the approach ... is that by undertaking incremental changes to the health care system and then assessing the impacts of these changes within strategic guidelines, Council will learn more about how to develop a pattern of health care delivery which will respond to the needs of the community. Health Council has adopted an approach which recognises that unpredictable social and economic changes will affect health care. Planning work will have to allow for uncertainty and keep open options for future action. In keeping with this view, the longer term strategic plan will attempt to guide and inform future decisions rather than specify precisely time actions. At the same time, Council does not intend to allow urgent problems to be neglected ... From the start, Council's Planning Team will document findings as they are made, in order to provide updated information which can assist ... Council in its decision-taking."

(O-CRDHC 1978a)

3. THE OVERALL APPROACH

In this section we describe the overall structure of the planning methodology developed during the course of the study. The Ottawa-Carleton planning team recognised the need to develop a long term planning framework to assist in policy formulation and to provide a context for short term decisions, as well as the need for operational plans specifying the resource implications of short term decisions. The temporal distinction between strategic and operational planning in Ottawa-Carleton parallels that between the strategic plans and annual programmes characteristic of the present approach to planning within the British National Health Service (D.H.S.S. 1982). The way in which the distinction was made operational in the Ottawa-Carleton context, however, is important to an understanding of how the methodology was adapted to the needs and responsibility of the DHC.

Strategic planning in Ottawa-Carleton was seen as entailing the assessment of system performance across a range of possible future environments and the identification of alternative directions in which the existing system might be reconfigured in response to those environments over the long term. By contrast, operational planning was intended to provide guidance for immediately pressing issues, against the background of the possible long term configurations. Operational plans were developed with reference to the next 3 to 5 years, up to what might be termed the 'implementation' horizon, while strategic planning focussed on a more distant and uncertain planning horizon, 8 to 10 years beyond the implementation horizon. The way in which these two time horizons were considered in the planning methodology was influenced signficantly by the policy mandate and the planning responsibilities of the O-CRDHC.

One of the primary responsibilities of DHCs is to respond to pressures or proposals for change which originate from other agencies or groups within that district. For example, a DHC is required to advise on a local health care provider's proposal to expand services by endorsing or dissenting from the proposal and making its reasons known to the proposer, to the community and to

the Minister of Health. Thus a DHC must be able to respond intelligently to proposals for short term changes in the health care system, while having only a limited ability to influence which changes may be proposed.

In addition to this reactive role, however, DHCs are also charged with responsibility to co-ordinate and integrate longer term development of health services; to discourage actions which would result in duplication and waste; and to try to ensure that 'gaps' within the health system are identified and acted upon. This task of looking to the longer term, with an eye for improving the regional delivery of health services provides a context for the policies which DHCs adopt, the decisions they reach and the proposals they support in the short term.

The planning methodology adopted by the Planning Program was a response to the tension between these short term and long term responsibilities of the Council. Because of the absence of executive authority, the DHC was obliged to evaluate proposals for change not in the context of a 'master' plan or grand development strategy, but simply as more or less disjointed and incremental changes to the existing system. At the same time, the DHC was required to assess how - in the aggregate - a series of such changes is likely to affect the evolution of a more co-ordinated and more integrated system in a longer term environment over which it has little control. So, while there was a need to take immediate decisions in response to pressing problems and in an attempt to improve the existing situation, there was a need to take these decisions in such a way that desirable options would be preserved in the future. The methodology developed reflects this. It emphasises, on the one hand, 'candidate' short term changes which are evaluated with respect to the system's existing performance characteristics; and, on the other, the robustness of these same outcomes in the light of alternative future configurations of the system and the performance of these configurations if subjected to alternative future environments.

The overall structure of the methodology is summarised in Figure 1. The

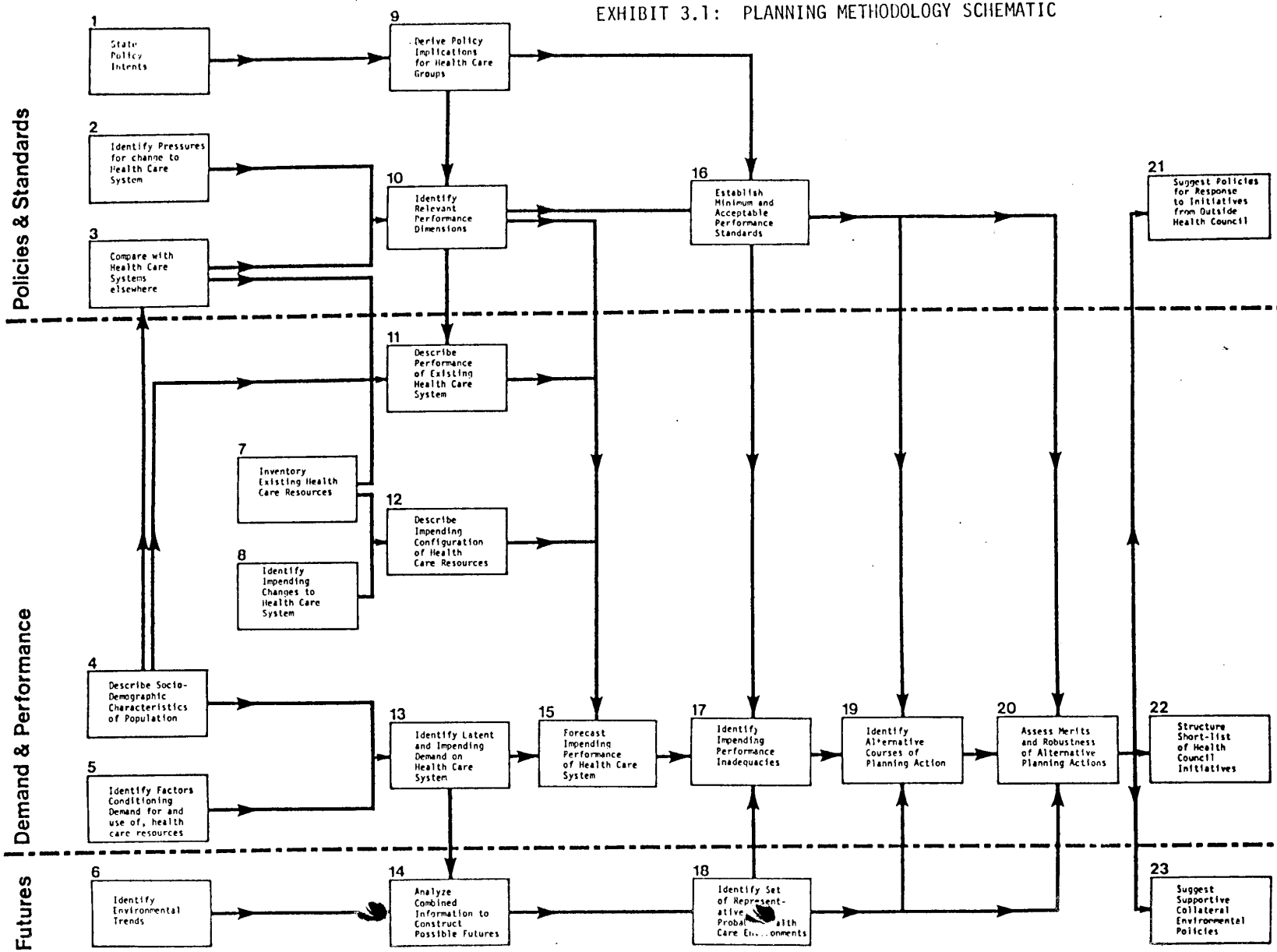
essential features of the approach can be explained in terms of the 3 horizontal planning streams : "policies and standards", "demand and performance" and "futures". These 3 systems reflect the multiple emphasis of the DHC's Planning Program. Thus comprehensive health planning was seen to be conducted within the context of provincial and regional government policy, and as a response to community views (policies and standards stream). The intent of planning was seen as to co-ordinate and provide direction for the deployment of local health care resources in response to local need (demand and performance). And it was recognised that planning on the basis of future predictions which may not come true could easily result in an inefficient, inflexible and inappropriate allocation of health care resources (futures).

As is implied, the policies and standards stream is concerned with the formulation of planning policies and the identification of dimensions of performance to which these policies relate (e.g. policies on appropriate levels of service provision; on acceptable thresholds of accessibility; and so on). This stream begins with inputs on the comparative performance of Ottawa-Carleton's health care system (box 3 in Figure 1) and on local pressures for modification to that system (box 2). In addition, it calls for explicit policy statements on desired objectives for the system (box 1). These inputs are then used to derive a set of "minimally acceptable" performance standards (box 16) which are one of the key elements in the evaluation of performance inadequacies (box 17) and alternative courses of planning action (box 19). The specific output of the policies and standards stream is a set of policy guidelines (box 21) intended to aid the DHC in responding to initiatives proposed by other agencies, institutions or groups which have some mandate for or concern with health services in the region.

The principal focus of the demand and performance stream is on describing the existing and 'impending' health care system (boxes 7, 8 and 12) and translating this into statements of 'impending' performance inadequacies (box 17). (The impending system consists of the existing configuration of health

Source: O-CRDHC (1979)

Figure 1



care resources (box 7) supplemented by imminent modifications (box 8) which will occur before the implementation horizon - i.e. the system that will exist in 3 to 5 years' time.) The emphasis in this system is on relating the quantity, availability and locations of health care resources to both the effective and estimated latent demand for health services (boxes 4, 5 and 13). Data on these attributes are then employed to forecast the impending performce of the system (box 16) and, together with inputs from other streams, to generate and assess actions which may be taken to modify the system (boxes 19 and 20). The principal output of the demand and performance stream is a short-list of possible and variously desirable planning actions which the DHC may wish to promote.

The futures stream is largely concerned with generating that information required for the O-CRDHC to develop a longer term, strategic perspective while, at the same time, not tying its policies and initiatives to a single vision (or set of predictions) of the future. This stream condenses various environmental uncertainties (boxes 6 and 14) into a set of discrete, representative and variously probable future states of the socio-economic environment within which the health care system may operate (box 18). Alternative courses of planning action are then assessed within the context of possible future system configurations, as these would be likely to evolve to meet performance standards under each of the representative future environments. Short term planning actions which improve impending performance, and contribute to anticipated satisfactory performance of a large number of configurations under many futures, are defined as 'robust'. Because changes in the environment of the health care system may have a significant impact on health, the specific output of the futures stream of work is a set of proposals which the DHC may promote for consideration by bodies in a position to influence environmental factors (e.g. municipal providers of social services; local housing authorities; etc.).

It is important that while Figure 1 provides a reasonably accurate picture of the methodology which was developed and pursued by the planning team, it

inevitably presents an overly simple version of the activities actually undertaken in attempting to implement that methodology. The captions within the boxes, for example, represent reasonably discrete tasks within the overall framework. They provide, however, few insights into the nature of the activities which were actually carried out in execution of each task. Similarly, the lines connecting different boxes denote only the principal interdependencies between tasks. By contrast, the actual work carried out did not unfold in the relatively tidy left-to-right manner of the diagram, nor, in practice, were many planning activities confined to a single box.

To illustrate with an example, box 2 contains the caption "Identify pressures for change to the health care system". The objective was to gain insights into what various groups in the community, key individuals or agencies and service providers felt to be inadequacies in the delivery of health services. Simultaneously, a major activity in this phase of the project involved a personal data-collection survey of over 300 agencies which had some mandate for the delivery of health services in the region, a task undertaken primarily to inventory existing health care resources (box 7).

Arising out of the survey, however, were a wealth of unsolicited proposals for improvement to the health system, as well as a number of suggestions related to what would be acceptable performance standards (box 16), and to what health-related trends and developments within the region were most significant (box 6). Many of these suggestions were adopted and, indeed, where 'hard' data or measurements were lacking, such informal but informed judgements were utilised as alternatives. Moreover, as is stressed in Section 4 below, we believe this to be a strength rather than a weakness of the approach.

In order to provide a clearer understanding of the overall approach, it is useful to look more closely at two central aspects of the methodology. The first of these is taken from the uppermost stream in Figure 1, and focusses on the identification of minimally acceptable standards of performance. The

objective was to identify a number of dimensions or in some cases 'metrics' of performance which could be used to help identify strengths and weaknesses in the existing delivery of health services and to contribute to the assessment of the performance merits of proposed changes in the delivery of health services.

While traditional planning approaches attempt to set and meet optimum or ideal goals, the approach adopted at Ottawa-Carleton consciously rejects the optimum as untenable and unrealistic, given the uncertainty of the future. It was not the purpose of the O-CRDHC Planning Program to specify an optimal future configuration of health services, because this task would have required control over changes made to the system, as well as near-perfect knowledge of the future. Rather, the objective was to admit into the analysis a relatively large number of proposed changes, and to consider whether these would have the effect of bringing system performance up to minimally acceptable standards or of improving on performance which was already acceptable, under a range of probable future conditions.

The identification of performance dimensions and the setting of minimally acceptable standards involved a number of formal and informal inputs. As already mentioned, the survey of health and health-related agencies produced a number of insights and proposals relevant to understanding the dimensions along which the community tended to judge performance. Additional information was derived from provincial and regional standards and guidelines where these existed, from comparisons with the standards adopted elsewhere, and, in a small number of cases, on the basis of 'expert' opinion. Inputs from any or all of these sources, together with the community's perceptions of 'need', were utilised establishing relevant dimensions and setting performance baselines, which could be raised to new levels of acceptability in subsequent planning cycles.

A second central aspect of the Ottawa-Carleton methodology lies in the futures stream and concerns the way in which alternative pictures of the future were developed and integrated into the analysis. Although it is impossible to

predict the future events to which the structure of the health care system will respond, it is possible to investigate different long term configurations of the system which might prove advantageous should particular patterns of events come to pass. Given these investigations, it is possible then to pose such questions as : "How does this short term action help to meet current objectives if a particular set of future conditions occur?", or "Does another action retain more flexibility by affording a viable solution across a broader range of future occurrences?".

The futures stream developed alternative future states of the long term environment within which the health care system may be expected to evolve. The consequences of each of these future states for the performance of the existing system were examined to identify possible future inadequacies in the system, and long term strategic responses to these inadequacies (in terms of modifications to the quantity, availability or location of services) were then devised. The resulting alternative future configurations of the health care system consisted of the existing system as transformed by different combinations of these long term strategic modifications.

In order to carry out the analysis, it was necessary to identify a manageable number of reasonably discrete dimensions along which social change might occur. The five areas of change utilised in constructing the futures were : government action, population, technology, health practice, and economics. The next task was to combine these changes to produce coherent and consistent possible future states of the health care environment. Changes in a particular dimension may logically or practically exclude or require changes in a range of other dimensions (e.g. a "stringency spending" future is unlikely to be compatible with a whole range of developments, which, however desirable, would be costly). Producing credible scenarios of alternative futures involved the exercise of judgement, with the planning team relying on a panel of experts whose opinions were solicited through a modified Delphi survey, in which

panelists were grouped according to their propensity to agree on different future scenarios.

These feasible future scenarios were used to construct a more limited number of representative futures, each standing in for a range of futures. Representative futures, four of them, were selected to be not improbable, but meaningfully different, and to be relevant to the outcomes of decisions likely to be confronted by the DHC during planning. Those factors in a future environment which could have an impact on the impending health care system were identified, and particular attention was paid to demand and supply factors, such as demographic tendencies and economic conditions, which could provide a quantitative basis for judgement.

Many of the factors which arose from the survey results, however, encompassed the myriad issues which have a significant but quantitatively immeasurable effect on health and on health services development. These include such phenomena as the increasing emphasis on prevention, changes in the occupational status of women, shifting political influences among health professionals, and more effective treatments of specific diseases. These changes were also identified in each future in order to provide a more complete view of the conditions - both quantitative and qualitative - which do and will affect the evolution of health care.

The next stage was to project the configuration of the impending health care system onto each of the representative futures. If, for example, there were currently an inadequacy with respect to a particular health care service, then future changes could often be seen to either exacerbate or relieve this inadequacy. If, as another example, current uses of a particular service or health profession were expected to change, then pressure for the development of alternative services could be expected. This procedure allows for an evaluative consideration of the performance of the health care system in light of possible future conditions. In addition, supply factors which were identified in the first stage of the analysis were used to generate the budgetary parameters

within which the future health care system would operate.

The last stage of the procedure brought together the description of the performance of the impending health care system, DHC policies, and budgetary constraints in order to generate alternative long term strategies for modifying the existing configuration of the health care system in response to the set of alternative future conditions. For example, all of the future configurations developed in this way incorporated a response to, on the one hand, a DHC policy on the availability of care to the mentally ill and, on the other, future inadequacies in the care for mental patients which arise within all of the projected futures. However, each configuration differed in the way in which this response was realised, and these differences grew out of the characteristics which differed among the four futures - e.g. the likely level of provincial intervention in the mental health sector, the degree of emphasis on non-institutionalised delivery of care, etc.

Tables 1-4 present a more detailed picture of this phase of the work. Altogether, the futures survey involved approximately 200 respondents in 3 rounds of questionning, with the clustering into representative groups occurring after the first round. Table 1 provides an illustration of the form of questionnaire used and Table 2 includes a typical example of how the responses to the questionnaire were clustered following the first round. The scenarios which emerged from the survey provided the basis for the four representative futures. Table 3 gives an illustration of some of the ways in which the futures differed, and Table 4 provides an illustration of how the different future states were used in the construction of alternative future system configurations.

Table 1

Source: O-CRDHC (1978b)

What is the likelihood that this change will occur between 1978 and 1983?	What is the likelihood that this change will occur between 1984 and 1988?	What is the likelihood that this change will occur between 1989 and 1998?

1 - impossible
7 - virtually certain

025 The proportion of the government dollar spent on health manpower education will increase

1	2	3	4	5	6	7
d	E G	A B C F				

1	2	3	4	5	6	7
	d	A C E F G	B			

1	2	3	4	5	6	7
		C d E G	A B F			

026 There will be a decrease in the proportion of the health dollar spent on services rendered by private practioners

1	2	3	4	5	6	7
	E	A C D F G	B			

1	2	3	4	5	6	7
		C D E	A B F G			

1	2	3	4	5	6	7
		E D	A B C F g			

027 There will be a decrease in the proportion of the health dollar spent on acute care hospitals

1	2	3	4	5	6	7
			A	B C D E F G		

1	2	3	4	5	6	7
			B A	C D E F G		

1	2	3	4	5	6	7
			B D F	A C g	E	

028 There will be a decrease in the proportion of the health dollar spent on technological research

1	2	3	4	5	6	7
		F	B C E G	A D		

1	2	3	4	5	6	7
		E F G	A D B C			

1	2	3	4	5	6	7
			D	A B C E F G		

029 There will be an increase in the proportion of the health dollar spent on ambulatory care

1	2	3	4	5	6	7
				A D B C E F G		

1	2	3	4	5	6	7
				B C D F G	A E	

1	2	3	4	5	6	7
				D	B F G	A C E

030 There will be an increase in the proportion of the health dollar spent on home care

1	2	3	4	5	6	7
				B D A C E f G		

1	2	3	4	5	6	7
				B C D G	A E F	

1	2	3	4	5	6	7
				d	B F G	A C E

Table 2

Source: O-CRDHC (1978b)

SUBJECT	GROUP A	GROUP B	GROUP C	GROUP D	GROUP E	GROUP F	GROUP G
Health Insurance (cont'd)	L. a minimum charge will not be imposed on users	L. a minimum charge will be imposed on users	L. a minimum charge will not be imposed on users	L. a minimum charge will be imposed on users	L. a minimum charge will not be imposed on users	L. a minimum charge will be imposed on users	L. a minimum charge will be imposed on users
	L. costs to user will not be based on ability to pay	L. costs to user will be based on ability to pay	L. costs to user will not be based on ability to pay	L. costs to user will be based on ability to pay	L. costs to user will not be based on ability to pay	L. costs to user will not be based on ability to pay	L. costs to user will not be based on ability to pay
	gov't action will limit patient choice	gov't action will limit patient choice			gov't action will not limit patient choice	gov't control will limit patient choice	gov't control will limit patient choice
Policy and Legislation	L. DHC's will be given control over health spending	L. DHC's will be given control over health spending		L. DHC's will not be given control over health spending	L. DHC's will not be given control over health spending	L. DHC's will not be given control over health spending	
	S. equalization payments will be made for health care in depressed regions	S. equalization payments will be made for health care in depressed regions			S. equalization payments will not be made for health care in depressed regions		
	health funds will be allocated on the basis of regional priority-setting	health funds will be allocated on the basis of regional priority-setting	health funds will be allocated on the basis of regional priority-setting	health funds will not be allocated on the basis of regional priority-setting	health funds will be allocated on the basis of regional priority-setting		health funds will be allocated on the basis of regional priority-setting
			there will not be increased differences between urban and rural patterns of care		there will be increased differences between urban and rural patterns of care		there will be increased differences between urban and rural patterns of care
	L. gov't will regulate the geographic distribution of MD's	L. gov't will regulate the geographic distribution of MD's			gov't will not regulate the geographic distribution of MD's		

Table 3

EXHIBIT B.1: CHANGE STATEMENTS FROM THE FUTURES SURVEY (continued)

Source: O-CRDHC (1979)

	CATEGORY	FUTURES 1	2	3	4
113	Environ. discard	yes		yes	yes
*					
115	Environ. supply	yes	yes	yes	yes
116	Environ. discard	no	no	no	no
117	Environ. supply		no	yes	no
118	Climate variable	yes	yes	yes	yes
119	Climate variable	no	no	no	no
120	Candidate action	yes	yes	no	
121	Environ. supply	yes		yes	
122	Environ. supply	yes	yes	yes	yes
123	Climate variable	yes	yes	yes	yes
124	Environ. demand	no	no	yes	
125	Climate variable	no	no	yes	no

Source: O-CRDHC (1979)

Table 4

EXHIBIT 3.2: COMPARATIVE ORDERS OF MAGNITUDE OF RESOURCE PROVISION IN ALTERNATE FUTURES

CARE SETTING	PRINCIPLE RESOURCE	IMPENDING PROVISION	CONFIGURATION 1	CONFIGURATION 2-a	CONFIGURATION 2-b	CONFIGURATION 3	CONFIGURATION 4
RESIDENTIAL NON-INSTITUTIONAL AND RESIDENTIAL INSTITUTIONAL SETTINGS	Physician Visits/ month	4,900	2,500	2,500	2,500	8,100	7,200
	Nursing Visits/ month	8,380	13,100	13,500	11,400	11,100	11,800
	Allied Health Visits/month	1,200	8,000	8,000	6,200	1,500	1,700
	Home Help Visits/month	4,200	9,000	9,300	7,500	7,000	7,800
	Telephone Visits/ month	5,900	11,000	11,000	8,800	9,000	9,300
	Meal Visits/ month	5,700	14,300	12,500	11,600	10,700	11,000
	Public Health Visits/month	8,200	12,000	10,700	10,700	10,100	11,350
	Child Hostel Places	490	660	440	440	480	540
	Domiciliary Hostel Places	1,140	2,350	2,250	1,800	1,900	2,000
	Psychiatric Hostel[a] Places	361	530	640	510	470	530
	Senior Citizen Housing Places	5,911	12,200	10,200	10,200	11,100	11,300
	Handicapped Housing Places	20	35	30	30	30	35

a. includes psychiatric, addiction, crisis, mental retardation and correctional hostel places and psychiatric group housing places.

4. ELEMENTS OF AN ALTERNATIVE METHODOLOGY

The general shape of the planning system devised for the Ottawa-Carleton Regional District Health Council has been outlined in the previous section. Here we identify and analyse in more detail certain elements of this system which exhibit characteristics of the 'alternative methodology' summarised in Section 1.

(a) Acceptance of uncertainty and maintenance of options

The importance of this dimension in the work for the O-CRHDC can be demonstrated at a number of levels.

At the level of abstraction it can be shown that the method developed for planning is in broad outline the same as that proposed elsewhere (Rosenhead 1980) as a methodology for robustness analysis[1]. Robustness analysis, as indicated in Section 1, is centrally concerned with the maintenance of flexibility under conditions of uncertainty, and the Ottawa-Carleton approach is informed by the same purpose.

At the level of aspiration, we may quote the first sentence in the long term planning report of the O-CRDHC Program : "This is not a plan". The report constitutes not a master plan but a strategic evaluation. "The complexities of the health care system, imperfect knowledge of its operation, and uncertainties about future conditions require a planning approach which manages short term resource commitment while retaining long term flexibility". The purpose of the report is to provide a context within which the O-CRDHC can "produce short term operational plans which keep options open for long-term development" (O-CRDHC 1979).

At the level of practice, the way in which options for future decisions were maintained lay in the identification of possible action sets and of possible future health care system configurations. To demonstrate their

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1. This earlier description has in fact been modified and further elaborated in the light of experience of the particular situation of the planning agency, and the specific content of health services planning.

interrelationship, the planning team also undertook the first cycle of operational planning - in this instance, for gerontology services in the region. As part of the operational planning, alternative action sets were assessed in terms of their compatibility with the range of alternative health system configurations which, taken together, provide satisfactory performance across the identified alternative future environments. In this way those action sets which left open opportunities for subsequent adaptation to meet a variety of as yet uncertain future events and conditions could be indicated.

At the level of results, the Ottawa-Carleton Planning Program was able to identify 4 alternative future environments for the health care system, and 5 possible configurations for the system itself, each reflecting different developmental emphases. "Each of the configurations would entail significant alteration to current and impending resource provision. Many of these changes are appropriately responsive only to the particular characteristics of the future within which they occur. However, a study of each of the 5 configurations shows that several broad areas of development can be pursued over the medium to long term with some confidence that they will remain viable across the range of alternative future environments" (O-CRDHC 1979). The report then specifies 13 areas in which at least limited development could be pursued without foreclosing options in such a way as to endanger system performance.

Subsequent to the Planning Program, O-CRDHC has employed the same form of analysis to produce operational plans for other services, including mental health services and acute care hospital services. In each case the action sets which ultimately were recommended were found to be compatible with these specified areas of development.

(b) Co-ordination rather than optimisation

There are those who claim that any method of assigning a scale-value measure of desirability (such as a robustness score) to decision alternatives amounts to optimisation. In this view, any act of choice defines the selected alternative as 'optimal' because it is, in practice, preferred over its

competitors. Such a claim, reducing optimisation to a truism, drains it of all content. In any case, the distinction between optimising and non-optimising approaches escapes from definitional traps if one considers not robustness scores but a robustness methodology such as that employed in Ottawa-Carleton.

A crucial role in this methodology is given to the identification of minimal and acceptable standards of performance. The performance dimensions which were adopted for evaluation of the existing system related primarily to the quantity, availability, and accessibility of services. The quantity dimension reflected the rates of provision of different services across different sub-groups of the regional population, while the availability and accessibility dimension reflected the responses of the system to characteristics and distribution of the population as well as normative - or judgemental - information. The availability dimension was intended to provide some indication of the range of health services available to the regional population (e.g. preventative; primary care; secondary care; etc.), as well as on the 'continuity' of those services (e.g. referral between residential, mobile, ambulatory and inpatient levels of care). Table 5 contains an illustration of some of the data which were collected, and of some of the units of performance which were used for measurement along the quantity and availability dimensions. The accessibility dimension was intended to reflect in part the 'match' between the geographic distribution of the population and that of the various different health services, as well as the relationship of different services to the regional pattern of public transport.

The standards were based on a 'satisfying' approach which recognises that, instead of there being only one 'best' way, there can be, in principle, a multitude of solutions which are 'satisfactory'. Robustness analysis produces rankings of possible action sets in terms of their consistency with these satsifactory solutions, to be sure, but the rankings serve as only one factor in the analysis of potential actions. Thus an output of the Ottawa-Carleton

methodology is the activity "structure short list of Health Council initiatives" (not "select most robust action for implementation"), the implication being that the robustness approach enables decision-makers to organise their thoughts about uncertainty and flexibility, not that these are their only concerns.

The robustness methodology employs what are sometimes called "option scanning" or "what if ..." methods, which concentrate only on drawing out the consequences of particular decisions of interest. The decisions to be examined are then a matter of judgement rather than for optimising algorithms, as are any comparative evaluations of the alternatives being considered. Thus the approach attempts to answer questions of the form "what actions might we usefully be able to take in the future, if we commit ourselves now to this particular set of initial decisions". Instead of relating action to consequential outcomes, the approach relates action to possible sequential actions, and is concerned essentially with the co-ordination of actions, particularly those which are separated in time.

The planning method devised for Ottawa-Carleton goes beyond the implicit co-ordination of the actions of a single decision-making body, to construct a format for the co-ordination of actions of the variety of bodies which are linked together by their involvement in the local provision of health services. Two of the three end products of the robustness methodology itself were of this type. One of these was the construction of possible guidelines for response by the Regional District Health Council to proposed initiatives from health services providers - a need not uncommon among social planning agencies, but appreciated in operational research studies to only a limited extent (Stringer 1967; Friend et al. 1974).

The second such product was the attempt to affect the 'future environment' to which the health care system would be subjected, insofar as elements of that future were controlled by other bodies whose policies might be influenced by the DHC. Here again, the mainstream O.R. paradigm, with its assumption of a clear boundary between the system (which is partially controllable) and the

Source: O-CRDHC (1979)

Table 5

EXHIBIT 2.20: TOTAL 1978 RESOURCE PROVISION

CARE SETTING	1978 RESOURCE PROVISION BY CARE SECTOR					TOTAL RESOURCE PROVISION
	INFANT & CHILD	GERONTOLOGY	MATERNAL	MENTAL HEALTH	PHYSICAL ILLNESS	
Residential Non-Institutional and Residential Institutional	Physician Visits (600; 6/1000)	Physician Visits[a] (2,400; 60/1000)	Physician Visits		Physician Visits	4,900; 9/1000
	Nursing Visits (380; 3/1000)	Nursing Visits[a] (3,000; 75/1000)	Nursing Visits (20; 1/6700)	Nursing Visits (90; 1/5900)	Nursing Visits	8,380; 15/1000
	Allied Health Visits (400; 3/1000)	Allied Health[a] Visits (300; 8/1000)	Allied Health Visits (220; 2/1000)	Allied Health Visits	Allied Health Visits	1,200; 2/1000
	Home Help Visits (200; 2/1000)	Home Help Visits[a] (3,200; 80/1000)	Home Help Visits	Home Help Visits	Home Help Visits	4,200; 8/1000
		Meal Visits[a] (5,700; 140/1000)				5,700; 140/1000 elderly
	Telephone Visits (600; 5/1000)	Telephone Visits[a] (1,600; 40/1000)	Telephone Visits (200; 2/1000)	Telephone Visits (4,100; 8/1000)		5,900; 11/1000
	Public Health Visits	Public Health[a] Visits (1,800; 46/1000)	Public Health Visits (1,700; 13/1000)	Public Health Visits (400; 1/1300)	Public Health Visits	8,200; 8/1000

a. provision ratio based on 1978 non-institutionalized elderly resident population: 39,600.

Parenthesized figures: (total quantity; ratio of provision to care sector population). Quantities of visits are given as monthly averages; estimates are rounded to nearest hundred.

environment (generator of random disorder) is unhelpful.

(c) Reduced demands on data

The major requirement for data inputs arises in the "demand and performance" stream of the Ottawa-Carleton methodology. There are a number of facets of this approach which reduce the level of quantification and the total demand for data.

The identification of impending and future performance inadequacies were used to generate, respectively, alternative action sets for immediate implementation and possible alternative future configurations of the health care system. This is a satisfying approach and is based on resource inputs. Each resource is measured in its own units, with no requirements for inter-resource trade-off values. The need for measures of the benefit of outputs, which could involve sophisticated and speculative inference from past behaviour[1], is avoided.

Another factor reducing the demands for hard data is the greater reliance on subjective inputs. Impending performance inadequacies are identified, not just by a mechanical comparison of resources and population, but also as a result of comments obtained during the survey of health care delivery agencies. The same source provided direct suggestions as to possible components of initial action sets, as did the exercise to discover pressures for change in the wider community. The alternative feasible and adequate health care system configurations for any of the identified futures are generated not by an automatic process, but by an interactive procedure. In this the judgement of planners and Health Council members was applied to the predicted inadequacies in performance, to provide alternative means of meeting these inadequacies. In these and other ways the 'hard' and 'soft' data are used to supplement and complement each other. The application of judgement reduces the need for collection of apparently objective but often dubious quantitative information.

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1. As in the 'Balance of Care' or 'Inferred Worth' model - see, for example, Gibbs 1978.

Equally, the role of 'hard' data is relegated, appropriately, to that of stimulating and supporting the judgemental process.

(d) Facilitation of participation

It should be clear that a good deal of the evidence in the previous section also supports the contention that the Ottawa-Carleton methodology can facilitate participation. Insofar as a reliance on a high quantification, high technology approach to decision analysis promotes the exclusion of the mass of those affected from involvement in the decision-making process, the substitution of a low-technology approach based on the interaction of data and judgement can make the process more transparent and accessible. To this extent, the methodology described in this paper has the potential of making participation more widespread and effective.

Another factor which inhibits public participation is the monolithic nature of strategic plans, in which the broad shape of the whole system under study some 10 to 20 years into the future is sketched out in more or less detail. Especially for those not practised in the manipulation of abstract concepts it can be difficult to relate the future to the current state, and so gain a sense of the significance of the changes proposed. To the extent that this factor reduces participation, the Ottawa-Carleton methodology has potential to facilitate it. Its concentration on the next step in decision-making (which can also be explored in terms of its compatibility with alternative futures) provides a concrete point of reference - the possible marginal changes to a known and experienced system.

However, there are other non-technical barriers impeding participation in planning. Most members of our society have a reasonable expectation that their contribution to decision-making is unwelcome, or will be welcomed only to be ignored. The experience of powerlessness outweighs the rhetoric of planners, however sincere. Where real interests clash the powerful do not voluntarily cede their advantage. Indeed, the entire structure of representative democracy, and the elaborative theories which justify it, rests on a deliberate exclusion

of the mass from effective involvement in the decision-making process (Pateman 1970). It is not, perhaps, over-cynical to see the mathematisation of planning as having progressed in large part because it reinforces this pre-existing exclusion.

In Ottawa-Carleton the 'pressure for change' exercise itself was a modest step towards participation. The Regional District Health Council's openess to this specific planning activity, as well as to a more transparent methodology in general, is and was most welcome. It is, however, worth noting again the Council's status as a non-executive agency - a co-ordinate body with influence but no powers of command. It is at least possible that agencies whose decisions dispose of large resources and so affect directly the interests of influential groups in society may find less appeal in a greater openess which can facilitate public participation.

(e) No abolition of politics

The methods of rational comprehensive planning (including operational research) have contributed to what has been called "the sublimation of politics" (Fay 1975), in which active debate between partisans is replaced by the 'scientific' pronouncements of experts. Alternative methods alone cannot revive politics - but they can assist its resuscitation, and in a variety of ways. Indeed, it can be asserted that the aspects of the alternative methodology already described in this section each contributes in part to the enabling of political debate.

One feature of the method developed for Ottawa-Carleton which is particularly relevant to the repoliticisation of the planning process is its handling of the identification of possible futures for the environment of the health care system. In the project description which secured funding for the Planning Program a proposal was made to use the "Delphi" technique for this purpose - an approach which would have clashed with the multi-future philosophy of the methodology if not applied in a non-standard way.

Delphi is an iterative technique devised to overcome reliance on individual intuition about the future by enlisting the help of a panel of informed people. The approach is typified by a succession of questionnaires, or rounds, each constructed using the results of the previous questionnaire to provide feedback to the panel. The method has been characterised as "organised brain-storming". Delphi "seeks to induce opinion convergence" (Helmer 1966), however, and so to generate consensus among experts. Such an approach would clearly have been unsuitable in an exercise which aimed to identify possible alternative futures; it would also have been inimical to any attempt to avoid the depoliticisation of planning, since politics is concerned with the interplay of conflicting interests and opinions. A method which assumes or manipulates a consensus theory suppresses conflicts which can then express themselves only outside the planning process.

Delphi thus could not fit within the alternative methodology unless it could be adapted to produce a number of significantly different alternative futures - that is, to generate conflict, rather than consensus - and thereby eliminate its unwelcome characteristics. As a result, the planning team modified the standard technique by submitting the early-round responses to a form of statistical analysis called a cluster analysis. Respondents were grouped according to their general propensity to agree on change statements. A subsequent round of the survey served to refine the descriptions of alternative scenarios as proposed by the different clusters of respondents. The consensus generating procedures of "Delphi" were then performed separately within each group, with a view to producing a range of maximally divergent but internally cohesive alternative futures.

This adaptation of a technique from the classical methodology is perhaps a modest example of the potential for 'radical reuse' of existing technology. Another example of 'radical reuse' is in the process (described in Section 3 above) by which the predicted inadequacies of performance, should there be no change in the health care system, are used to generate possible future system

configurations. This procedure is similar to that of 'reference projection' - see Ackoff (1976), also Ozbekhan (1977). But Ackoff performs only one reference projection, and uses it largely to motivate members of the organisation under study to accept the need for far-reaching changes. As incorporated in the Ottawa-Carleton methodology, multiple projections indentify directions and magnitudes of changes which may be required. It cannot, of course, summon up conflicts where none exists, or of itself activate political debate which may be held in check by other forces. But it does at least indicate that the planning process itself has some potential for reshaping in such a way as not to constitute in itself an obstacle to such debate.

5. CONCLUSIONS

The work reported here is only a part of that carried out by the O-RDHC planning team, a great deal of which was required to make operational the general principles of the developed methodology (with inevitable adaptations to particular circumstances). Nevertheless, a reading of the final project report will confirm that the approach described in this paper remained a major informing principle of the planning team's work. At this writing, the O-CRDHC is developing proposals to assess the results of its first five years of planning, and to undertake a second round of long-term strategic evaluation for all health services.

In the present document we have had twin aims :

- to demonstrate that an approach based on robustness analysis is by no means incompatible with the demands of health services planning;
- and to illustrate the differences between this (as an example of the 'alternative methodology') and the classical operational research or health planning approach too often adopted unquestioningly and unnecessarily.

Our hope is that, to the extent that we have been successful in these aims, this paper may encourage others to adopt a planning methodology which aims at the maintenance of flexibility under uncertainty, and serve to widen somewhat the circle of those planners who subject their own activity to critical scrutiny.

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