PROJECT NO. 2-1223

AUGUST 1975

POLICY FORMULATION PROCESS FOR THE RADIO FREQUENCY SPECTRUM

DEPARTMENT OF COMMUNICATIONS

the bureau of management consulting is an agency of the department of supply and services

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INTRODUCTION

The Bureau of Management Consulting was retained by the Director of Spectrum Utilization of the Department of Communications to conduct a study on the methodology of making policies concerning the use of the radio frequency spectrum. As developed in January 1975, the Terms of Reference for the study were:

> *To establish methodology guidelines for the development of spectrum utilization policy in the Department of Communications.*
>
> *Specifically:*
>
> *a) To evaluate and document current methodology and/or policy systems in related fields that are considered timely and applicable to the development of spectrum utilization.*
>
> *b) To ensure that the methodology guides policy planning in a manner so that appropriate aspects of the following subjects are included:*
>
> - *Economic*
> - *Commercial*
> - *Social*
> - *Technical*
>
> *and so that there will be a minimum of reaction that would require policy reconsideration.*
>
> *c) To ensure that proposed methodology is in line with general government policy in other areas particularly:*
>
> - *federal-provincial relations*
> - *regional and northern development*
> - *regulation of private sector activities*
> - *general DOC regulatory and private sector policy*

During the subsequent client-consultant discussions leading to the preparation and approval of the study work plan, it was decided that the main emphasis would be on designing a process for formulating spectrum policies and on defining possible policy-making pitfalls and the attendant guidelines by which they could be avoided.

Approach

The approach taken in conducting the study is detailed in the work plan included in Appendix A. Briefly, it called for a review of the literature on public policy-making, a definition and analysis of the historical and present process for making spectrum policy, and an examination of policy-making processes being used by other federal government departments and agencies. This combination of self-evaluation and comparison with theoretical models and actual processes of other policy-makers was expected to provide the foundation needed to fulfill the purpose of the study.

Appendix B contains a list of the officials interviewed during the course of the study. For the very busy officials in the participating organizations we would like to express our sincere appreciation of their positive contributions to the study. Collectively, their inputs have added a useful degree of up-to-the-minute reality to the undertaking.

At about the midpoint of the study, a background paper was prepared for the client. It dealt with such matters as the definition of policy, various policy-making models, the historical evolution of the

spectrum policy-making process and the need for changing it. The paper is attached as Appendix A to this report. Three or four major conclusions have been drawn from that paper.

First, considerable vagueness surrounds the use of the word "policy". In fact, its meaning seems to vary from case to case and from person to person. Second, no concensus exists yet on which of the models of the policy-making process advanced by policy scientists is the most relevant. Policy-making remains very much an art as policy science per se is still in an initial stage of development with most of its findings being based on research in a few and somewhat specialized fields of public policy. (i.e. defence, education, agriculture)

Third, the historical method of making spectrum policies is not well suited to the general situation in which spectrum policy-makers find themselves today nor to the increasingly mature state of development which the spectrum itself is approaching. The final conclusion is one that flows from the foregoing three, namely, the nature of the process used to make policies is a key issue in its own right.

The Report's Purpose and Structure

The purpose of this report is to propose a comprehensive, systematic and logical process by which the Department of Communications can formulate policies on the allocation of the radio frequency spectrum. In addition, the report will identify possible pitfalls that can be encountered in formulating spectrum policies and, where possible, will suggest guidelines for avoiding or minimizing their occurence.

In most general terms, the report deals with the mechanics and dynamics of the process. It commences with an overview of the proposed policy formulation process in terms of the factors influencing its

design, its general nature and the pitfalls which are applicable to many or all of its stages. It continues with a more detailed discussion of each of the four main stages, namely, initiation, investigation, consultation and decision and completion. Particular attention will be given to the investigation and consultation stages as the client's main concerns are to be found there.

The process proposed herein, while superior in many respects to that now being used, is by no means the ultimate way to formulate policies on spectrum allocation. In fact, a more appropriate view is that it is the beginning of what necessarily should be a continuous effort to enhance the Department's capacity and capability to make such policies. As such, it offers not only the prospect of increased efficiency of policy-making as an activity but also the opportunity of improving the actual content or substance of the policies.

Peter Drucker surely must have had the complex subject of policy-making in mind when he said:

> "There is only one tool for this job: to convert into system and method what has been done before by hunch or intuition, to reduce to principles and concepts what has been left to experience and rule-of-thumb, to substitute a logical and cohesive pattern for the chance recognition of elements."

If not, it doesn't really matter for his wise words are equally appropriate here; they convey the essential spirit behind this report and the undertaking which lead up to it.

PART ONE - AN OVERVIEW OF THE PROCESS

Factors Shaping the Process

As a starting point to this part we will briefly comment on the major factors which influenced the general nature of the proposed process. The first is the radio frequency spectrum as the physical object of the policies to be formulated.

(1) The Spectrum

The spectrum is a natural resource. It is a resource which, in the seventy-five years that technology has made it available to man, has acquired strategic importance throughout the world. The spectrum is a key component of Canada's six billion dollar radio communication system. The spectrum is a medium for the transmission of energy and information. Common uses include microwave heating ovens, radio arc welders and direct broadcast television.

In relation to other natural resources, the spectrum possesses some unique characteristics. Although it has finite limits of capacity, it is physically intangible and indestructible. As well, it only has utility when it is being used. Further, it is available everywhere at the same time and hence does not respect political boundaries. As a result, the use of the spectrum has been the subject of international coordination, co-operation and regulation from a relatively early stage in its history. In this regard, developments and decisions in the United States are of particular importance to Canada.

Technology has been and will likely continue to be one of the, if not the, prime determinants of the usable portion of the spectrum and the demand for its use. Technology has also provided substitutes

for the radio frequency spectrum as a medium for transmitting information and energy. Thus, for the spectrum policy formulator maintaining a constant awareness of technological developments affecting radio telecommunications will be an important activity.

(2) Spectrum Policy Issues

The second factor bearing on the nature of the general process is the substantive issues which constitute the subjects of spectrum policies. The fundamental issue is the allocation of a finite natural resource among a number of increasingly competing claims in such a manner as to secure the maximum possible benefit to present and future generations of Canadians. In simpler words, the main substantive issue is "dividing the pie." As a result, the dynamics of the process will frequently involve the resolution of conflicts, the reconciliation of divergent values, interests and objectives, the sometimes subtle and other-times overt use of various forms of power, the negotiation of tradeoffs and compromises, and the designation of big winners, little winners and even losers.

We anticipate that the fundamental issue will devolve into seven major ones, namely:

- the first time allocation of a new band of spectrum or a new spectrum-based radio service
- the reallocation of existing bands or services
- the rationalization of existing services in a band
- the development of Canadian Government positions or proposals to the International Telecommunications Union on the foregoing and the analysis of related proposals from other I.T.U. members
- the assessment of the impact of technological developments and user demand forecasts on the availability and efficient utilization of the spectrum

- the determination of socio-economic benefits of spectrum utilization to Canadians and of ways for its valuation
- the assessment of the impact on spectrum utilization of broader federal policies.

These issues will spawn a series of spectrum policy projects which will vary in importance and urgency and which also will collectively exceed the Directorate's capacity to handle. Thus the process must contain a mechanism for setting and revising the priorities of these projects.

(3) Organizational Environment

The third factor is the organizational environment in which spectrum policies will be developed. Although the federal Minister of Communications has total jurisdiction over the radio frequency spectrum, the policy formulation aspect is exercised on his behalf by the Directorate through a complex web of relationships within and between governments and between public and private sectors of society. Internally, the Directorate operates in a matrix environment. To develop comprehensive and sound spectrum policies, it will frequently have to obtain specialist assistance from other units within National Branch and from units in such branches as Social Policy and Programs, Economic Policy and Statistics, Federal-Provincial Relations, Telecommunication Regulatory Service and Technology and Systems Research and Development as well as the Regional Offices. Other federal departments and agencies who will be involved in many of the projects include the Canadian Radio-Television Commission, the Ministry of Transport, the Department of National Defence and the Privy Council Office. Beyond the federal sphere, one can anticipate that spectrum policy projects will be of interest to provincial government departments responsible for communications.

As well, there exists a host of commercial and private interests who will affect or be affected by the projects. One must include such institutions as the Canadian Radio Technical Planning Board, the Canadian

Association of Broadcasters, the Trans-Canada Telephone System, the Electronic Industries Association of Canada, the Canadian Telecommunications Carriers Association, the Canadian Cable Television Association and the Consumers Association of Canada. Non-associated suppliers and users of spectrum-based radio equipment or services also constitute an element of the Directorate's external organizational environment. And most certainly, other sovereign nations - particularly those in Region Two - will have representatives contacting the Directorate concerning some of its projects.

Given these many and diverse elements, the Directorate's working environment will be very dynamic. Thus its policy formulation process must facilitate the Directorate's ability to relate to, anticipate and to respond to changes in that environment.

The Policy Formulation Process

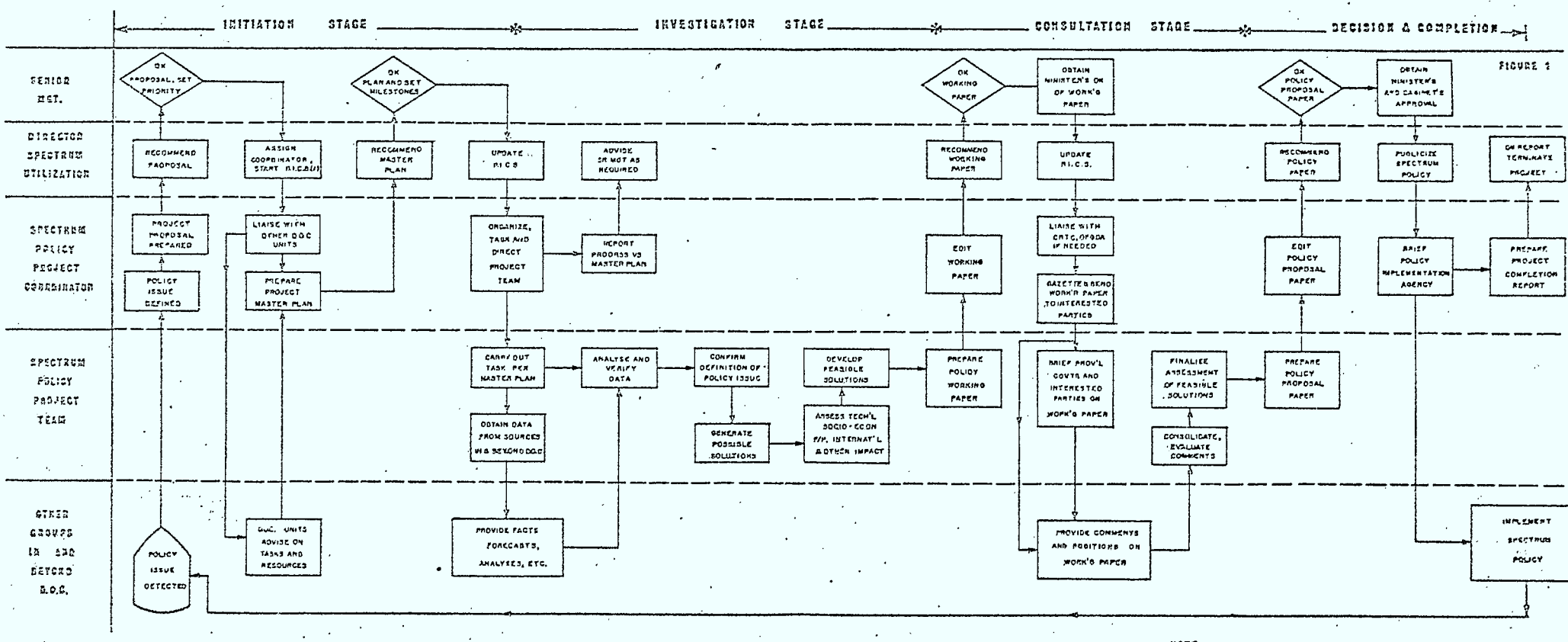
The policy formulation process which we are about to propose is actually an element of the broader ~~policy-making~~ process. That process has six basic phases, namely:

(1) initiation (problem recognition and definition)
(2) development (generating alternative courses of action and accessing their costs, benefits and consequences)
(3) decision (selecting the most appropriate course of action)
(4) implementation and operation
(5) evaluation (comparing actual results to intended)
(6) termination

Phases one, four and six, according to the policy scientists, are the least developed and understood. As well, considerable debate continues among them on which approach (i.e. rational, incremental, mixed) should be used in phase two. Each of these approaches are described in Appendix A of this report.

POLICY FORMULATION PROCESS FOR SPECTRUM UTILIZATION ISSUES

FIGURE 1



NOTE :

(1) PROJECT INFORMATION CONTROL SYSTEM

The policy formulation process encompasses phases one to three of the policy-making process. We make this distinction as we will use somewhat more precise and relevant terms in describing the policy formulation process.

From the foregoing, the basic nature of the Directorate's role can be clearly seen as that of the policy formulator, rather than the policy decision-maker, policy implementer or policy evaluator. In essence, the policy formulator provides the policy decision-maker, in this case the Minister of Communications or Cabinet, with the relevant information and advice on the policy issue, the alternative courses of action and their short and long term benefits, costs and consequences.

Figure 1 depicts the spectrum policy formulation process in flowchart form. It plus the following section will serve as a general introduction and explanation of the proposed process.

As indicated across the top of Figure 1, we have divided the policy formulation process into four stages: initiation, investigation, consultation and decision and completion. The passage from one stage to the next is not expected to be as definite and abrupt as that suggested by the boundary lines. In fact, some slight overlap will likely be experienced. However, the end of one stage or the beginning of another is clearly signalled by the preparation or approval of a tangible product (i.e. plan, paper, report) of the process.

The principals in the process are broadly defined along the left hand side of the flowchart. The "other groups in and beyond D.O.C." are primarily those organizations identified in the preceding section. The Policy Project Team, in our opinion, should be kept purposely small, say two or three members in addition to the Project Coordinator who would act as its leader. Each member should be a specialist in at least one of the

pertinent factors (i.e. spectrum technology, telecommunication economics, societal impact) and also a generalist to the extent of being able to relate his specialty to the others. This is particularly important in view of the Team's main role of analysing and integrating information on the issue (rather than generating that data) and generating and assessing alternative courses of action. Hence there is no need to include on the Team each and every supplier of data from within or beyond the Department.

Of course, it may not be necessary to establish a Team for the smaller, simpler policy projects. In such instances, the Project Coordinator would carry out the activities ascribed to the Team in Figure 1. The Project Coordinator will usually be one of the senior officers of the Directorate of Spectrum Utilization and will normally be a specialist on spectrum technology. More importantly, the Project Coordinator will manage the project, in other words, getting it done in the manner and within the time, dollar, manpower and quality targets set out in the Master Plan approved by Senior Management.

Whereas the Project Coordinator manages one or two policy projects, the Director of Spectrum Utilization directs, coordinates and controls the program consisting of all such projects. Developing priority criteria, securing necessary resources, advising Senior Management on the progress and ultimate output of the projects and, most importantly, sensitizing Senior Management to the significance and urgency of various projects and relaying Senior Management concerns, values, etc. to Project Coordinators will be key activities of the Director.

The principal role of Senior Management is to make the major decisions concerning each project as it progresses through the stages of the policy formulation process. The composition of Senior Management will likely vary from project to project and even from one stage to the next for a single project. For example, the Minister's or Cabinet's approval of the Working Paper or Policy Proposal Paper may be required whereas the Senior ADM or Deputy Minister's approval will likely be

sufficient for Projects Proposals, Master Plans and Progress Reports. For small and medium size projects such approvals probably will be given by executives levels immediately below the foregoing.

Features of the Process

There are a number of features in the process which warrant highlighting. For example, there is a conscious attempt to integrate the management of policy formulation with its execution. Previous models have, in our view, ignored this very essential aspect. The integration is achieved by calling for the explicit setting and revising of priorities among policy projects, the activation and subsequent updating of a project information and control system and the reporting of project progress to Senior Management in accordance with the milestones designated in the approved Master Plan.

A second feature is the nature of the products to be provided by the process. There are three prime products, namely, the Working Paper, the Policy Proposal Paper and the Spectrum Policy Statement. Complementing these are four support products: the Policy Project Proposal, Project Master Plan, Progress Reports and the Project Completion Report. The purpose and general content of these documents will be outlined in later parts of this report.

The manner in which the definition of a policy issue and the generation of alternative solutions or courses of action are handled is another feature of the process. For the former, we advocate that an explicit review of the initial definition be made during the early part of the Investigation Stage. This step is essential to ensure, in light of additional information, events and the passage of time, that the definition remains valid, the issue continues to be relevant and its assigned priority appropriate and the focus of the Team's efforts and intentions does not stray from the issue's resolution. For the alternative solutions, we propose that their generation be clearly separated in time from their assessment so as to encourage a maximum of creativity and innovation at this key point. In the assessment step,

those factors critical to the situation (usually only two or three in number) are used to reduce the possible solutions to feasible solutions which the Team then develops fully as to nature, costs, benefits and short and long term consequences.

The inclusion of a Consultation Stage is, as far as we know, a unique feature relative to earlier conceptions of the process. We consider it to be a distinct stage rather than an activity common to all other stages in view of the organizational environment noted in the previous section and in light of the very specific and important objectives we will ascribe to it later in this report. Hence, we differentiate between informal discussions and contacts which may occur throughout the process and the formal sequence of steps which make up consultation.

A sixth feature of the process is the Project Completion Report. It provides a positive means for terminating a spectrum policy project and thus reduces the vagueness or uncertainty usually surrounding the transfer of responsibility from the policy formulator to the policy implementer. Equally important is its use as a self-learning tool for the process. The Report gives the Project Coordinator the opportunity to comment on the overall process as a result of his experiences in getting a project through it. From this and like reports from other Project Coordinators, the Director will be able to identify and introduce worthwhile improvements or new elements into the process.

General Pitfalls

At this point, it would be appropriate to identify and comment on some possible pitfalls which are applicable to more than one stage of the policy formulation process. One such pitfall is poor definition or acceptance of the roles of the various parties involved in the policy formulation function. Many attempts to develop policy have been frustrated or rendered fruitless by preoccupation with who is going to do what rather

than getting the what done. Unsettled disputes between policy formulation and policy implementation executives can adversely affect the interest, enthusiasm, motivation and morale of those involved to the extent that the entire process breaks down. According to J.G. Abert in the September 1974 issue of Policy Sciences[1] such role disputes, more than talent or resources, are the main reason why policy formulators fail to do their job or to do it well.

Closely allied with the foregoing is the failure to secure and maintain the active support and commitment of senior management to the policy project. Such support is particularly critical in a matrix environment where the competition for human and other resources is very keen, priorities are susceptible to sudden changes and where only senior management has the authority to allocate these resources. This pitfall can be significantly minimized by obtaining senior management's express approval of Policy Project Proposals and Master Plans and by keeping them up to date on the project's progress.

A third possible pitfall is inadequate documentation of the key decisions, events and information pertaining to the formulation of the policy. It can lead to needless and embarassing duplication of effort, wastage of time and other resources and omission of details, all of which can invalidate the policy and compromise the policy formulator's credibility. Thorough documentation facilitates continuity in an environment which is characterized by a high turnover of staff in policy formulation units. Even if turnover is low, given the scope, complexity and duration of most projects, it is unrealistic to trust to anyone's memory the myriad of data which will be generated. Having a well documented policy project is also essential to policy implementers when questions of interpretation and application arise and to policy evaluators when they assess the actual results of the implemented policy.

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(1) J.G. Abert, Policy Sciences, Volume 5. Number 3, September 1974, P. 245

Thus, a log of all telephone conversations should be kept; minutes of meetings of the Policy Project Team or members thereof with representitives of other groups in and beyond D.O.C. should be made; a record of decisions made by Senior Management should be maintained. Far better to err on the side of too much rather than too little documentation in such complex undertakings as policy formulation.

PART TWO - INITIATION STAGE

In this part of the report, we will elaborate on the activities and products of the Initiation Stage and detail a possible pitfall which, in our view, is among the most serious. The Initiation Stage has two basic objectives. The first is to define the policy issue which, in general, can be either a problem such as a congested band or an opportunity such as a new spectrum-based service. The second is to get the policy project underway by securing Senior Management's approval, particularly its commitment of the human and other resources needed to conduct the project.

Issue Detection and Definition

The first step in the Initiation Stage is the detection of the existence of the spectrum policy issue. This triggering of the process can be done by any number of organizations or individuals. For example, spectrum policy issues can become apparent as a result of:

- general public complaints to the Minister or Members of Parliament
- mass media articles and editorials
- periodic briefs to the federal government by suppliers or users of spectrum-based equipment or services
- proposals on spectrum allocation from member nations of the I.T.U.
- applications for radio licences
- spectrum related technological developments in and beyond Canada
- previous spectrum policy formulation projects
- general activity of D.O.C. staff involved in various functions of spectrum management

Detecting an issue can and likely will entail some description of its nature. Defining the issue, however, is a more comprehensive activity and one that is critically important to the overall policy formulation process.

The way in which the issue is defined will greatly influence the decisions Senior Management will make on handling it. It will also determine the nature and extent of the Investigation Stage. Let us consider then what is involved in defining a policy issue.

In addition to verifying the nature of the issue, a comprehensive definition entails a quantitative as well as qualitative description of its causes and effects, its scope and impact (internationally as well as domestically), its relationship to previous or other current issues and a listing of parties known or thought to be interested in or affected by it. Many issues characteristically consist of a nest of problems. In these cases, the problems should be categorized in such terms as primary or secondary, short term or long term, easy or difficult to solve. By defining the issue in this fashion, one will gain a clearer understanding of its importance, its urgency and the critical factors involved in its resolution. It will also enable one to make a simple, concise, unambiguous statement of the issue in the Policy Project Proposal.

There are three possible pitfalls that should be noted in connection with issue definition. The first is the tendency to mistake the shell of the issue for its core, or to confuse symptoms for causes. This can lead to an incomplete or inappropriate course of action being adopted. Brainstorming the issue's causes and effects with others within D.O.C. can be very helpful in avoiding this pitfall. As well, challenging the initial list of reasons for the issue's existence can lead to the identification of more fundamental causes and hence, a better understanding of the issue.

The second is the temptation to include a possible solution in the issue definition, particularly in describing the nature of the issue. Doing so can result in the unintentional and harmful limiting of the range of alternative solutions generated and assessed during the Investigation Stage. This is not to say that possible solutions readily apparent in the Initiation Stage should be omitted from the Policy Project Proposal. It does mean, however, that a clear distinction should be made and maintained between them and the issue definition.

The third possible pitfall is to consider the issue definition to be cast in concrete. In spite of the comprehensive manner in which the issue has been defined, it is important to recognize that it is dynamic and subject to change over time and that information gathered during the Investigation Stage may provide new dimensions or fresh insights on it. To avoid this pitfall, we have included the review of the issue definition as a step in the Investigation Stage.

Project Proposal and Approval

The Policy Project Proposal has three basic purposes:

1. to sensitize Senior Management to the issue
2. to secure Senior Management's approval in principle to proceed with the project
3. to have Senior Management assign a priority to the project that is consistent with its urgency and importance.

The comprehensive definition of the issue and the possible solutions apparent are topics which naturally are included in the proposal. In addition, the Proposal should attempt to relate the issue to broader concerns currently commanding the attention of Senior Management. Any special considerations or constraints should be noted as well as the probably consequences of not proceeding with the project. Finally,

an initial outline of the approach to be taken in conducting the project and a rough estimate of the time, money and manpower required should be included in the Proposal.

Before recommending the Proposal to Senior Management, the Director of Spectrum Utilization should determine the impact of its resource requirement on the budget and suggest the priority to be assigned in light of criteria developed for that purpose. He should also ensure that the content and format of the Proposal is such as to make it an effective mechanism for gaining the desired attention, interest, commitment and action of Senior Management.

The Master Plan

Assuming Senior Management has commented on and accepted the Project Proposal, the assigned Project Coordinator proceeds with the development of a Project Master Plan. This entails defining the objectives, assumptions and constraints governing the Project, elaborating upon the approach by detailing the nature, sequence and timing of the tasks which must be carried out, identifying the organizational units within D.O.C. responsible for each task, and making more definitive time, cost and manpower projections for the entire project. Where tasks are to be carried out by D.O.C. units outside National Branch, they should be asked to confirm the nature, time and manpower estimates of the tasks and their capacity to take on the tasks, prior to the Plan being finalized for Senior Management approval. Where insufficient capacity exists within D.O.C. and the priority so warrants, contracted professional services can be substituted. Similar liaison should, of course, take place with any unit which will be expected to assign one of its staff to the Policy Project Team.

In addition to these standard elements of a plan, the Project Coordinator should include the following:

- a description of the information to be gathered from what parties beyond D.O.C. during the Investigation Stage
- comments as to whether any adverse consequences are anticipated in contacting any of the foregoing parties
- comment on whether a public announcement of the project's commencement would be appropriate
- a tentative outline of the content of the Working Paper to be produced at the end of the Investigation Stage.

The Initiation Stage concludes with Senior Management approving the Project Master Plan, particularly the allocation of human resources from the various units within D.O.C. and the designation of the milestones by which the Project's progress will be monitored. With this explicit commitment from Senior Management, the way is now clear to proceed with the actual development of a spectrum policy.

PART THREE - INVESTIGATION STAGE

There are three principal objectives to the Investigation Stage, namely:

(1) to improve one's understanding of the policy issue

(2) to generate and assess alternative courses of action

(3) to prepare the Working Paper documenting (1) and (2)

In essence, this is the fact-finding or the research and analysis stage; the stage where the Policy Project Team gets its homework done. The degree to which the homework is done well will greatly determine the credibility of the Project Team's and the Department's claim to leadership and competence in resolving the issue.

Among themselves and with respect to others contacted during this stage, the members of the Project Team should consciously and continually strive for open-mindedness, neutrality and objectivity. By so doing, they will minimize the risk of being victimized by their own or others' biased views of the issue or preconceived, unsubstantiated responses to it. Equally important, the Team will thereby reduce the likelihood of prematurely polarizing the issue and the problems of an attendant emotion-charged atmosphere.

Data Gathering

In this section, we will describe in general terms the how, what and who of data gathering and detail four associated pitfalls. Information is the life-blood of any decision-making process. For policy formulation, it is singularly important as it is the governing variable for the nature and appropriateness of the policy decision.

(1) Identifying Information Requirements

The initial step in gathering data is to have the Project Team meet to identify the information to be collected. Typically, a general body of information common to most spectrum policy projects will be involved. The nature of this information will be outlined presently. As well, the Team should develop its specific-to-project information requirements by considering the issue definition, and tentative solutions noted to date and the interests, concerns and key decision-making factors expressed by Senior Management.

It would be unrealistic at this point to expect the Team to identify all of its information needs. There are bound to be some requirements which will become apparent only after obtaining and analysing the more obviously needed information. Thus, relative to Figure 1, data gathering and data analysis will not be entirely sequential. Rather, there will be a discernable interplay between them. To be more precise, then, this first phase of the Investigation Stage will commonly proceed through four steps:

(1) initial identification and gathering of data

(2) preliminary analysis and detection of additional information needs

(3) search for and collection of additional data

(4) further analysis and verification of data

Identifying the information requirements in advance of gathering the data will expedite the latter activity by giving it a definite direction and emphasis. It will also reduce, although not eliminate, the occurrence of information gaps. Such factors as resource limitations, be they time, money and/or manpower, relationship constraints, non-existant data or an incomplete understanding of the issue will create information gaps.

It is therefore an inescapable reality that spectrum policies will be based on something less than complete information and certainty. It will be a continuing challenge for the Project Team to make every reasonable effort to minimize these gaps by gathering the most pertinent data.

(2) Typical Information Needs

The general body of information pertinent to most spectrum policy projects consists of five major subject areas. Within each quantitative and qualitative data can and should be gathered. The first subject area is the policy issue; its nature, symptoms, causes, effects, consequences and linkages with other issues. The second area is the historical background. The major ideas, events, studies and decisions of the past often shape the present and influence the future. Being aware of them is most useful and even necessary to avoid past mistakes or to take advantage of ideas whose time may now be arriving.

The present situation constitutes a third subject area. Typically, information on the commercial, technological, economic, social and political aspects of the situation should be obtained. Commercial factors include the companies involved, the nature, number and value of their spectrum-based products or services, their profitability, market share, fixed assets, capital structure, availability of resources, and degree of foreign control. Economic factors include the industry-wide commercial picture, its contribution to the gross national product, balance of payments, merchandise trade account, job creation, its linkage with other industries and its relationship to government programs for economic or social development. Social factors include the current major concerns of the general public, the number, location, standard of living, values, attitudes and aspirations of the people affected by the issue. Common political factors would be federal-provincial relations, government-industry relations, other issues of concern to the political executive and other federal policies that may affect or be affected by the spectrum policy issue. If the spectrum policy issue can be related to one or more of

of the broader concerns or policies, it may require much less time and effort to sensitize Senior Management to the issue and it may prove instrumental in progressing the issue through study to decision and action.

The fourth subject area is the international situation. Information should be gathered on what other member nations of the ITU, particularly those in Region Two, have done or will likely do about the issue. The probable future is the fifth subject area. Information to be obtained here includes the trends and forecasts of the factors noted in the present situation plus possible technological developments that may affect the issue.

(3) Information Sources

The Project Team will usually gather the information from a number of sources within and beyond the federal government. Prior to seeking data from sources beyond the federal government, be they provincial governments, industrial associations, corporations or agencies of other national governments, the Project Team should be knowledgeable of the general relationship between each source and the federal government or the Department. If that relationship is a sensitive one, the Project Coordinator should obtain Senior Management's clearance to make the contact. With this proviso, the Project Team should be free to use sources external to itself as fully as possible as a way of generating the needed information in a minimum amount of time and cost to the project.

It may be appropriate or even necessary to obtain information during this Stage from some of the interested or affected parties. In such instances, the Team should advise the contacted party that this early and somewhat limited involvement is not to be mistaken for consultation; that, at this point, the government has no preferred solution in mind and that the Team seeks and receives the information without incurring any obligation to support any particular viewpoint, opinion on or solution to the issue.

For some policy projects, it may be advisable to engage outside consultants to carry out public opinion surveys or to provide other information requiring specialized generating techniques or being somewhat sensitive in nature.

Pitfalls of Data Gathering

Four pitfalls can be encountered in gathering data. The first is non-directed data gathering. It is relatively easy to become entrapped by this pitfall since it creates a sense of action and a feeling of progress and security in having obtained a great deal of data. Yet it can quickly exhaust the time, money and manpower budgeted without producing the required progress or results. Non-directed data gathering is most likely to occur if the Team has not developed its information requirements in relation to the policy issue, the key decision-making factors and the tentative solutions or has not kept these elements clearly in view during the actual gathering of the data.

A second pitfall is the tendency to interpret or filter prematurely the data being received during the initial search and thereby jump to conclusions about the issue or its tentative solutions. As will be detailed in the next section, the data should be analysed as to its relevancy, reliability and other characteristics before being used.

Another pitfall is not keeping each member of the Team updated on what information is being received by the Team. In other words, each member should have the "big picture" in constant view. Periodic meetings of the Team should be held so that the members can share the information pertaining to their subject areas and the problems or opportunities they have encountered in gathering it. Such exchanges and the accompanying cross-fertilization of ideas can lead to the detection and closing of data gaps, additional insights on the issue, further tentative solutions and a greater sense of unity and purpose within the Team.

Office-bound data gathering constitues the fourth pitfall. It is part and parcel of the "ivory tower" syndrome which has plagued many previous policy formulation endeavours. Researching files and reading past studies on the issue is but one part of the exercise. Similarly, contacting external sources by telephone, letter or questionnaire alone is insufficient. Team members should be encouraged to meet the external sources where the issue is actually being experienced. Such face-to-face contacts and first-hand exposure will yield more relevant information and a better comprehension of the issue as well as foster the interpersonnal relationships needed to enhance the degree of acceptance of the subsequent policy decision.

Data Analysis

As noted earlier, an interplay takes place between data gathering and data analysis. The purpose of the preliminary analysis is to ascertain what gaps exist between the information required and the information received. Gaps can arise for a number of reasons including:

- data simply does not exist
- source not willing or able to provide the requested data
- additional information requirements identified after the receipt of initial data.

Having made every reasonable effort within the limitations of the project budget to close the data gaps, the Team then analyses the data as to its nature and quality. Data can be categorized in a number of ways. For example, it can be hard or soft. Hard data is essentially quantitative and relates to such tangibles as the physical, technical, operational and economic aspects of the issue. Soft data is, by contrast, qualitative and refers to such intangibles as the social and political aspects of the issue.

Data can also be classed as either fact or opinion. While the Team naturally seeks to gather facts, it will also receive opinions, some of which may be presented as facts. It is not only important for the Team to distinguish between facts and opinions but, also, to differentiate the opinions in such terms as unsubstantiated, informed, expert or widely accepted. As well, the Team will have to determine whether fact or opinion will be the basis of its ultimate policy recommendation.

A third classification of data is whether it is relevant or irrelevant. One of the major challenges at this point for the Team is "to separate the wheat from the chaff," to discriminate the essential from the superflous. For even though the Team may frame its requests for highly specific data very clearly, many of the external sources will take the opportunity to supply additional information on their views of the issue and their positions on its resolution. Such data is more appropriate to the Consultation Stage than the Investigation Stage.

In analysing the quality of the relevant data, the Team should consider such factors as its reliability, completeness, accuracy, age and the method by which it was generated. As well, the Team should ascertain the assumptions, constraints, opinions or biases governing the source of the information. In particular, any interested or affected party contacted for data will tend to put forth facts, figures, forecasts, etc. in a way which best suits its interests, preconceptions or attitudes. These and indeed all sources should be asked to state explicity the assumptions, constraints, etc. which underpin the data they provide. The Team must be prepared to challenge the assumptions, etc. and to verify their suitability. It must not hesitate to obtain clarification from the original source or confirmation from a second source of key data in which it has little confidence. Poor decisions have often resulted from assumptions, etc. that were implicit or not well understood.

The foregoing is highly pertinent to forecast data concerning long term requirements for spectrum. They likely contain contradictions, uncertainties, questionable assumptions, faulty arithmetic and wishful thinking. The validity of the method used to develop the forecast should be considered. Some test of reasonableness should be applied to the amount and rate of the forecasted changes, especially where order of magnitude changes are projected. Where more than one source provides a forecast on the same topic, this can be done by comparing the results, the methods and the underlying assumptions and constraints. Where only one source exists, this can be done by relating the current forecast to previous ones and the previous ones to actual results.

The major pitfall which data analysis attempts to avoid is the use of data from external sources without prior consideration of how, why, when and by whom it was generated. Such unsuspecting use of data all too often leads the policy formulator blindly down the proverbial garden path.

By now the Project Team should have an adequate base of valid and pertinent data and reasonable forecasts from which it can confirm and/or clarify the policy issue and thence develop and assess alternative courses of action for resolving it.

Review of Policy Issue

A sound way of beginning the second or problem-solving phase of this stage is to have the Team review the initial definition of the policy issue, as documented in the Policy Project Proposal. Relative to the Initiation Stage, many more people have been thinking about the issue and much more information on it has been obtained. The resultant better understanding should, in most projects, enable a more concise, clear and accurate definition of the issue to be made. As well,

further changes in the issue or its priority may have taken place by this point in time. Such changes should be incorporated in the definition. Also, reviewing the issue ensures that the Team's attention and efforts will be focused directly on it. This is an essential first step in generating possible solutions.

Generating Possible Solutions

In most instances, a number of tentative solutions will already have been advanced, albeit in a somewhat informal, random manner. The purpose of this step is to have the Team formally identify the full range of possible courses of action. A "think-tank" approach should be used here. Specifically, each member should propose solutions. The Project Co-ordinator should ensure that each member is canvassed and that none of them, for the moment, comments on the appropriateness of any of the solutions proposed. The primary objective is to tap the creative and innovative ideas of the Team so as to generate as many significantly different courses of action as possible.

Truly different alternatives, rather than variations on a common theme, should be sought. Thus solutions which are predominantly social or economic in nature as well as those that are basically technical should be identified. In addition to solutions having such vastly different dimensions, solutions which represent the extremes of the same dimension can be significantly different. As well, the status quo solution should be explicity considered as it can subsequently serve as a frame of reference against which the other possible solutions can be assessed.

In terms of numbers, the Team should attempt to generate five to seven possible solutions. More than that may prove to be unmanagable and usually indicates that some of them are variations of others rather than significantly different.

Assessing Possible Solutions

The possible solutions are assessed to determine which of them are the most feasible or practical. Although a possible solution may be predominantly social, economic or technical in nature, it will likely affect all of these and other aspects of the situation. Other assessment factors could include commercial impact, federal-provincial relations, government-industry relations, international relations, and other federal policies and programs.

Initially, the Team should assess each solution relative to the key factors identified by Senior Management in the Initiation State. This will enable the Team to establish comparatively quickly and easily those possible solutions which are clearly impractical and thus warrant no further consideration. The remainder, preferrably three or four in number, would then be assessed in terms of all the pertinent impact factors and, where applicable, subjected to such evaluative techniques as cost-benefit or cost effectiveness analysis, sensitivity analysis and risk analysis.

This comprehensive assessment is aimed at highlighting the assumptions, constraints, probable consequences and the quantifiable costs of each of the feasible solutions. There will be adverse and advantageous consequences in each solution for the various interested and affected parties. Some will be short term and other will be long term in duration. The long term adverse consequences represent new problems created in solving the current one. The Team should further develop the feasible alternative courses of action so as to avoid or minimize these adverse consequences. Otherwise, the cure may prove to be worse than the original affliction.

At this juncture, it is important for the Team not to draw any definite conclusions on what the preferred solution should be. To do so may blind the Team to some valid comments forthcoming from the ensuing Consultation Stage.

The Working Paper

The preparation and approval of the Working Paper constitutes the third and final phase of the Investigation Stage. This phase provides the Team with the essential opportunity of pulling together and documenting its current understanding of the spectrum policy issue in question. The basic content of the Working Paper should include:

- the definition of the issue, its causes, effects and importance
- a note on the historical background and the present general situation pertaining to the issue
- a full description of each possible course of action considered, including any associated assumptions and constraints.
- a discussion of the likely costs, benefits and consequences of each of the feasible courses of action
- an outline of areas of concern or uncertainty regarding the foregoing or the information on which it is based

The Working Paper is primarily intended to generate rational, orderly discussion and debate between the Department and those parties interested or affected by the spectrum policy issue and its resolution. It is by this mechanism that the Team seeks to obtain the input of these parties prior to preparing the ultimate Policy Proposal for the Minister's or Cabinet's consideration. The nature of the input sought should include facts, figures, forecasts of requirements for spectrum, comments on the assumptions, constraints and consequences of alternative courses of action, suggestions as to additional dimensions of the policy issue or further possible solutions to it, and opinions, concerns or positions on the feasible courses of action.

PART FOUR - CONSULTATION STAGE

Our inclusion of consultation as a full and formal stage in the policy formulation process represents a major change relative to earlier conceptions of the public policy-making process. We have done so in recognition of the rapid increase over the past decade of the number, activity and visibility of various pressure groups. These groups constitute a new dimension of complexity and uncertainty for those charged with the task of formulating public policies. Along with the mass media, pressure groups are making the process more open and, in many cases, more adversary in nature.

In this part of the report, we will consider consultation in terms of its purpose, its process and possible pitfalls. In essence, we will be commenting on such topics as who should be consulted, why and how should they be consulted, and what should the Team do with the output of the consultation. As mechanisms, methods and considerable experience already exists within the Department on dealing with foreign governments and the International Telecommunications Union, the ensuing discussion is not intended to apply directly to them. Furthermore, the basic nature of the Department's dealings with them is one of negotiation rather than consultation and, as such, is most appropriately undertaken subsequent to the policy formulation process.

The Purpose of Consultation

The purposes behind consultation can be as numerous and varied as those involved. For the Project Team and the Department there are at least three very sound reasons for consulting parties interested or affected by a spectrum policy issue prior to recommending a specific course of action. Consultation enables the Team to test and verify in a most meaningful way its understanding of the issue and the consequences of the alternative courses of action it has developed. Improvements in the

solutions or even additional solutions may be identified as a result.

Consultation satisfies the expectations of interested or affected parties to participate in the substantive formulation of pertinent policies. This can lead to a greater degree of understanding and acceptance of the course of action eventually selected by the federal government. As well, consultation permits the Team to determine the nature and extent of concensus or conflicting points of view among interested or affected parties concerning the issue and its alternative courses of action. Knowing who supports and who objects to the various solutions will be most helpful to the Team when it develops the Policy Proposal.

The Consultation Process

As indicated in Figure 1, there are three general groups to be consulted by the Team. The first group consists of other federal government departments and agencies.* For spectrum policy issues this will principally include the Canadian Radio-Television Commission, the Department of National Defence, and the Ministry of Transport. The second group is the provincial governments and the third is other interested or affected parties such as industrial associations, consumer groups and individual corporations or citizens.

In each case the challenge for the Team will be to get to the right people at the right time and in the right way. To meet this challenge successfully, the Team should develop an approach tailor made to each group prior to consulting it. The approach will usually be a function of the issue in question, the nature of the group, the managerial style of the Minister and his senior executives, and the broader concerns of the moment. The nature of the first two groups is generally well known to the Department as a result of long standing and continuous association with them. Where necessary, the Team can obtain specialist advice from

* Privy Council Office officials stressed the importance of thorough coordination within the federal government prior to consulting other groups and expressed their willingness to assist in this regard.

the Department's Federal-Provincial Relations Branch or the Privy Council Office on consulting with provincial governments. We will elaborate further on the third group in the next section of the report. The Team should also be aware of the coincidence of more general issues concerning telecommunications, the economy and federal-provincial relations as some groups may link the spectrum utilization issue with one or more of these broader concerns thus rendering its resolution more complex, longer in duration and less certain.

As indicated by the steps depicted in Figure 1, we view consultation as basically being a communicative process. In this regard, publishing the Working Paper in the Canada Gazette, although a valid step to take, is of and by itself incomplete. The Working Paper should also be distributed directly to all the parties that the Team considers to be interested in or affected by the spectrum policy issue. The Team also should invite these parties to nominate other parties who they consider to be concerned with the issue. The Directorate of Spectrum Utilization could, in time, facilitate such distributions by setting up and maintaining a mailing list of the parties.

Another very positive and vital step that the Team should take is to brief the parties on the Working Paper shortly after distributing it to them. Conducting the briefings in the regional centres of the country as well as Ottawa should enable the Team to personally reach most of the parties. The face-to-face character of the briefing can be of immense benefit to the entire policy formulation process. It provides the Team with the opportunity to emphasize the main aspects of the Working Paper, to promote greater interest in the issue and its resolution and to guide the ensuing actions of the various parties. It permits the parties to obtain quickly from the Team clarification of any points of confusion or uncertainty in the Paper. The interaction which naturally takes place during the briefing will allow the Team to assess the initial responses of the parties to the various solutions and to detect any developing sensitivities.

The Team may thereafter have to hold further discussions with some of the parties to gain a clear understanding of their written comments or positions concerning the issue. Occasionally, it may be advisable for the Team to exchange responses among some of the parties to facilitate the resolution of conflicting facts, opinions or positions. Such exchanges should be undertaken with the prior knowledge of the parties involved and, where appropriate, Senior Management. The Team should also analyse the information received as a result of consultation in the manner outlined in Part Two of this report.

Subsequently, the Team can proceed to its final assessment of the feasible solutions with the aim of recommending one of them to Senior Management as the course of action to be adopted by the federal government to resolve the spectrum utilization issue. In this and the other steps leading to the ultimate decision on the Policy Proposal by the Minister or Cabinet, the Team's thoughts and actions should be kept confidential to the government. Specifically, its informal or written analysis, advice and recommendations on the issue and its resolution must not be disclosed to anyone outside the government unless the Minister or the Cabinet has expressly authorized the Team to do so.

Consulting Other Interested and Affected Parties

Interested and affected parties other than those in federal or provincial governments can usually be placed into one of two groups, namely, institutional pressure groups or issue-oriented pressure groups. The ensuing description of the general nature of each is somewhat brief and tentative as very few systematic studies have been made on them in Canada.(1) Nevertheless, the available knowledge can be very useful to a Policy Project Team in developing its approach to consulting these groups and in handling information received from them.

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(1) The most recent and perhaps only book dealing directly with this element of the policy-making process is "Pressure Group Behaviour in Canadian Politics," A.P. Pross ed., (Toronto, McGraw-Hill Ryerson, 1975). This section is based primarily on the articles in that book.

(1) Institutional Pressure Groups

Within the context of spectrum utilization, institutional pressure groups include the Canadian Radio Technical Planning Board, the Electronic Industries Association of Canada, the Trans-Canada Telephone System, the Canadian Association of Broadcasters, the Canadian Cable Television Association, the Canadian Telecommunications Carriers Association and the Consumers Association of Canada. Here, as in other segments of society, one or two of these groups have been set up at the urging and with the financial support of the federal government.

Many of the foregoing associations continue to be oriented almost exclusively to the technical and commercial aspects of spectrum policy issues. Their capacity and competence for commenting on the social, economic and other, broader aspects of the issues is thus quite limited. This is a significant limitation as these aspects are usually of prime concern to those in government who decide on policy options.

As well, like most other institutional pressure groups, these associations are usually federated and thus tend to operate on a lowest-common-denominator or consensus-seeking basis with respect to their members. As a result, they frequently will encounter difficulties and take considerable time in developing a position on a given Working Paper. Even then, the position adopted may not be binding on the members. Hence, where timing is critical or firmly taken positions are sought, the Team may have to consult directly with the more dominant members of the pressure group.

In addition, an association may not necessarily contain one hundred percent of all possible members. The Team should also seek the comments and positions of unassociated parties. Although such parties may be few in number and small in size, their inputs can be very useful in expanding the totality of the Team's comprehension of the issue and the impact of each of the various solutions.

In assessing the input received from any pressure group, the Team should consider the relationship that group has with the general public. Because of the added mass media attention and the increasing use by governments of open forums in dealing with pressure groups, the general public has become more conscious and critical of a number of them. Hence, an even greater number of institutional pressure groups are abandonning their traditional low profiles in favour of trying to arouse public interest and support for their positions.

These groups also seek to secure a continuing close relationship with appropriate elements of the federal government. This is sought in such ways as:

- developing a wide network of friendly and sympathetic contacts within the political executive and the bureaucracy, especially at the branch head level and above.
- fostering an image or reputation for expertise, reliability, non-partisanship, trustworthiness and cooperation
- establishing and maintaining a steady, two-way exchange of information via mechanisms such as advisory committees, annual meetings, special seminars and luncheon conferences.

(2) Issue-Oriented Pressure Groups

These groups tend to be quite different from institutional ones. Issue-oriented pressure groups are less inclined to develop long term relationships with the government. They therefore are more likely to use a wider range of tactics and not to follow rules, procedures, etc. in getting their views across. They will try to use the mass media to gain publicity for their positions; to arouse and inflame public interest and to seek public support. Increasingly these groups look to challenge and confront the established power centres in society. Many of them are more ready to oppose rather than to propose change.

By nature, most issue-oriented groups exist only as long as the issue remains unresolved. Some, however, do evolve into institutional pressure groups, Pollution Probe being a case in point. It appears that a continuum of pressure groups will develop over time with groups in various portions exhibiting different behaviour patterns regarding public policy formulation. Successful interaction between a Policy Project Team and these groups will more and more depend on the Team developing a sound approach to each.

Pitfalls of Consultation

One possible pitfall of consultation is paying or appearing to pay lip service to the data, opinions and positions of the interested or affected parties. In seeking and obtaining such input, the Team incurs at least an intellectual obligation to handle it in a serious and objective manner. This requires the Team to assess the validity of the data and the relative merits of the opinions or positions advanced by the various parties and to ensure that it understands them clearly.

Another pitfall is for the Team to become aligned with or dependant upon one or two pressure groups for such input. The Team should remain open, neutral and at the same arm's length to all groups wanting to comment on the Working Paper. It should maintain an awareness of the motives and interests behind the participation of each group and the tactics they may be using to unduly influence the outcome of the Policy Project.

PART FIVE - DECISION AND COMPLETION STAGE

For the Policy Project Team, the main objective of this stage is to prepare the Policy Proposal. The Policy Proposal should summarize the issue, the various courses of action considered, (their nature, governing assumptions and constraints, benefits, costs, short and long term consequences) the principal reasons for recommending one and for rejecting the others, and the likely impact of the recommended course of action on the various interested and affected parties. Further, it should contain a master plan for implementing the recommended course of action. Such a plan would detail the agencies within and beyond the federal government responsible for or involved in carrying out the course of action, the sequence of activities, the amount of resources and the timing of the different phases making up the course of action, and suggested tactics for minimizing adverse reaction, for marshalling further understanding and support and for communicating the policy effectively to those affected by it. Normally, the agency responsible for implementing the course of action will be part of the Department of Communications. If that unit is not represented on the Policy Project Team, it should be invited to participate in the development of the master implementation plan.

Where the spectrum utilization issue warrants a Cabinet decision, a draft Memorandum to Cabinet should be included in the Policy Proposal. In such instances, it would be helpful to obtain informal comments from the Privy Council Office on the draft prior to seeking the Minister's and Cabinet's approval. It should be borne in mind that Cabinet, in particular, can allocate only a few minutes to considering most submissions.

For all projects, the Policy Proposal should contain a draft Policy Statement which the Minister or Cabinet could authorize for release to the public, the mass media and the affected parties. In this regard, the Team should also advise whether the Policy Proposal itself

should be declassified and made available to the public.

CONCLUSION

The foregoing policy formulation process is intended to be systematic, logical and comprehensive. How well it meets these characteristics can best be determined by using it to carry out two or three spectrum policy projects. Certainly further additions to or improvements in its content will have to be made. Nevertheless, we are confident that, in its present form, the process will tangibly reduce the otherwise high degree of complexity and uncertainty on how to formulate spectrum utilization policies. It provides the method by which those involved can concentrate their judgemental skills and creative intelligence more fully on the substantive aspects of policy formulation.

APPENDIX A

PROJECT 2-1223

BACKGROUND PAPER

SPECTRUM POLICY METHODOLOGY STUDY

MAY 1975

TABLE OF CONTENTS

INTRODUCTION

The purpose of this working paper is to report on the survey of literature on policy-making and on the historical evolution of the spectrum policy-making process. These were the two principal elements of the first phase of a study aimed at establishing a methodology for the development of spectrum utilization policy in the Department of Communications. The approved work plan for the study is depicted in Figure 1.

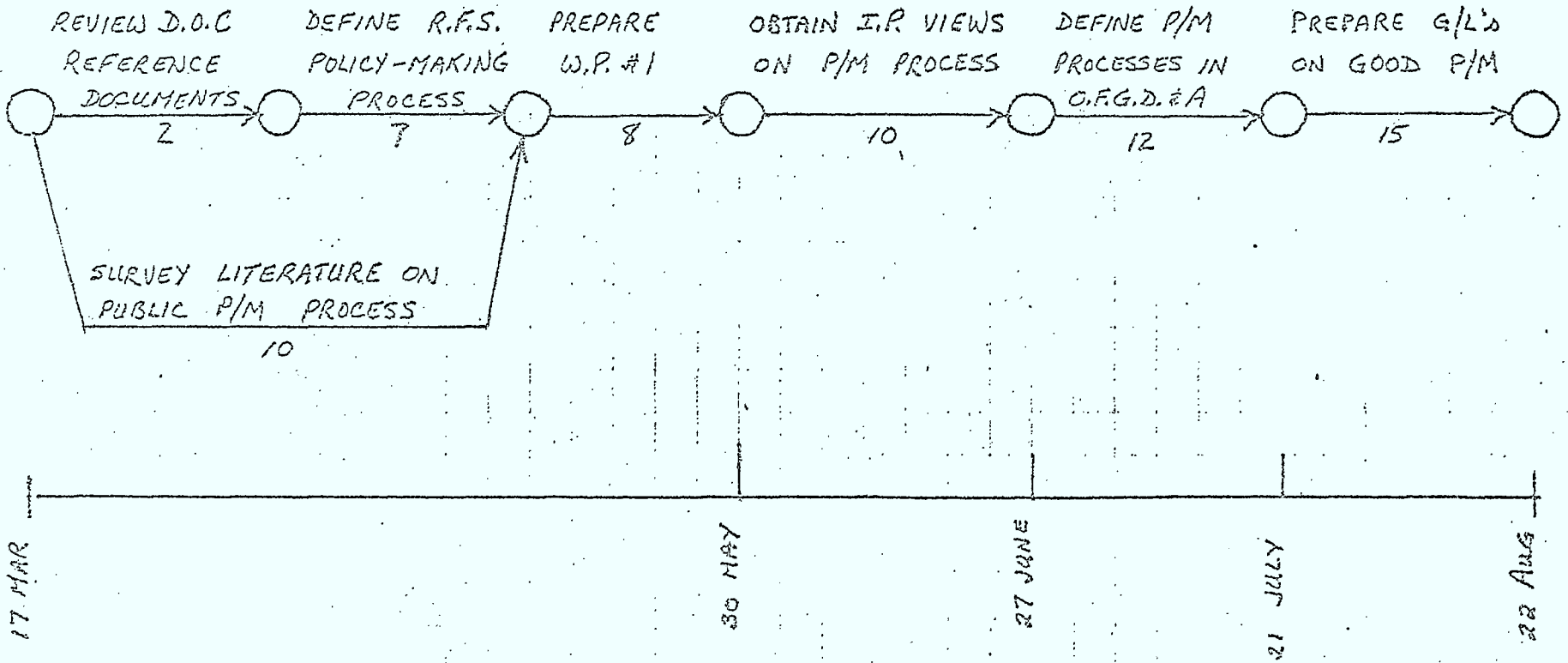
The basic approach to the study consists of determining the nature of the current spectrum policy-making process; comparing it to others being used in similar fields; relating it to those advanced by the policy sciences; identifying pitfalls, particularly those concerning data gathering, consultation tactics, demand/supply forecasts, appeals, roles of participants, balancing social, economic, technological and political factors and integrating spectrum policies with broader federal ones.

WORK PLAN - MC PROJECT 2-1223

FIGURE 1

POLICY-MAKING METHODOLOGY STUDY

SPECTRUM UTILIZATION DIRECTORATE



RESOURCE ESTIMATES

MANPOWER: 76 MANDAYS
COST: $15,375
TIME: 5 MONTHS

16 JUNE 75.

POLICY FORMULATION PROCESS FOR SPECTRUM UTILIZATION ISSUES

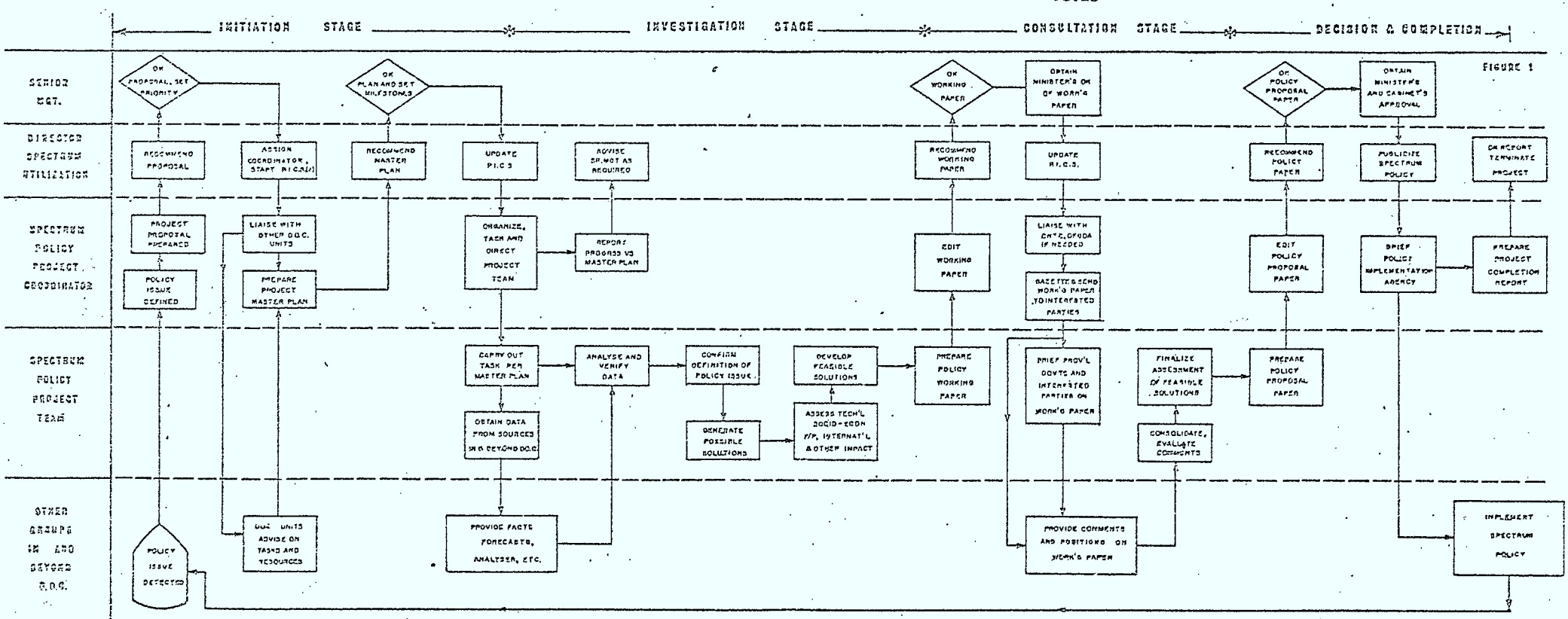


FIGURE 1

NOTE:

(1) PROJECT INFORMATION CONTROL SYSTEM

EVOLUTION OF THE SPECTRUM POLICY-MAKING PROCESS

Nature of the Spectrum

In order to make intelligent suggestions on improving the method of formulating policies on the use of the radio frequency spectrum, it is necessary to be aware of the general nature of the spectrum.

The generally accepted view of the spectrum is that it is a very important natural resource. Although it has always existed, man did not find a meaningful way for employing it until the turn of this century. In the 75 plus years since Marconi's invention of the wireless telegraph, the rapid and varied growth in the use of the spectrum has made it a resource of strategic national and international importance. In Canada, the spectrum is a key component of our six billion dollar radio communications system. This spectrum-based system plays a very fundamental role in strengthening the nation's cultural, social and political bonds. It thus constitutes an instrument of national policy and a tool for achieving national objectives.

It is similarly important to other sovereign nations. But the radio frequency spectrum, particularly that portion below 100 MHz, does not respect political boundaries. To avoid harmful interference and to promote orderly growth in the global use of the spectrum; international organizations, treaties and standards have been established.

The spectrum is unique in other ways as a natural resource. Unlike oil and gas for example, it is physically intangible and indestructible. Further, the spectrum exists and has utility only when it is being used. Yet it doesn't deteriorate or wear out with use nor is it altered or depleted. The spectrum, in still other ways, is similar to other natural resources. It is subject to pollution in the form of man-made or natural radio noise. Also it has a finite limit to its capacity which, in the face of seemingly

endless demand for its use, can lead to a scarcity situation.

Because of its strategic importance, its finite capacity and its proneness to interference and pollution, the radio frequency spectrum's use is governed by domestic and international government regulation.

The spectrum can also be viewed as a medium for the transmission of energy and information at radio frequencies. It is in this definition that one finds the uses to which the spectrum is put. The best known user of the spectrum is the telecommunications service which includes amateur radio operators, commercial radio and television broadcasters, police and other essential public agencies and the taxi and telephone companies. Other significant applications are radio astronomy, location and distance ranging for air and marine transport systems and national defence. The spectrum is also being used to transmit energy in such devices as radio arc welders and microwave heating ovens.

The foregoing is intended to give a general picture of the varied uses to which the spectrum is put. More detailed information can be obtained from the Table of Frequency Allocations.(1)

Technology has been and will likely continue to be the prime determinant of the usable portion of the spectrum and the demand for its use. Electronic technology in particular has played a seminal role in the creation of new spectrum-based services, in accessing of previously unusable portions of the spectrum and in improving the efficiency of the use of existing portions. Technology has also resulted in the development of substitutes for the radio frequency spectrum as a medium for transmitting energy and information. Examples include cryogenic conductors, laser beams and fibre optics. Whether these mediums or the spectrum are or will be used depends on a number of variables. In general, wherever mobility is a key requirement and wherever geographic,

1. Table of Frequency Allocations, Telecommunication Regulatory Service, Department of Communications, Ottawa, 1 October 1974.

climatic, economic or political factors preclude land lines, marine cables or optical waveguides, the radio frequency spectrum will normally be the preferred medium.

Having described the general nature of the spectrum, let us now consider how policies on its use have been developed up to the early 1970s.

Spectrum Policy-Making Prior to the 1970s.

The purpose of this section is to describe and comment on the method by which policies on the use of the spectrum were made up to the last few years. There are two principal reasons for attempting to identify the historical evolution of this or any process. The first relates to the dictum that those who do not know their history are liable to repeating it. The second is to provide a possible baseline against which proposed improvements to the policy-making process can be assessed.

In the first twenty years of its use, the spectrum was not subject to government policy. Anyone so inclined could operate his radio equipment on the frequency of his choice subject only to the technical capabilities of his equipment. At that time the transmissions were typically made at very low frequencies and carried over considerable distances and numerous political boundaries. By the early 1920s the resulting disorder and interference prompted many governments to arrange for the international allocation of frequencies. From this beginning the basic principle was established of dividing the spectrum into bands and specifying the types of radio services that could use a given band. A simple, three step method was evolved in this regard.

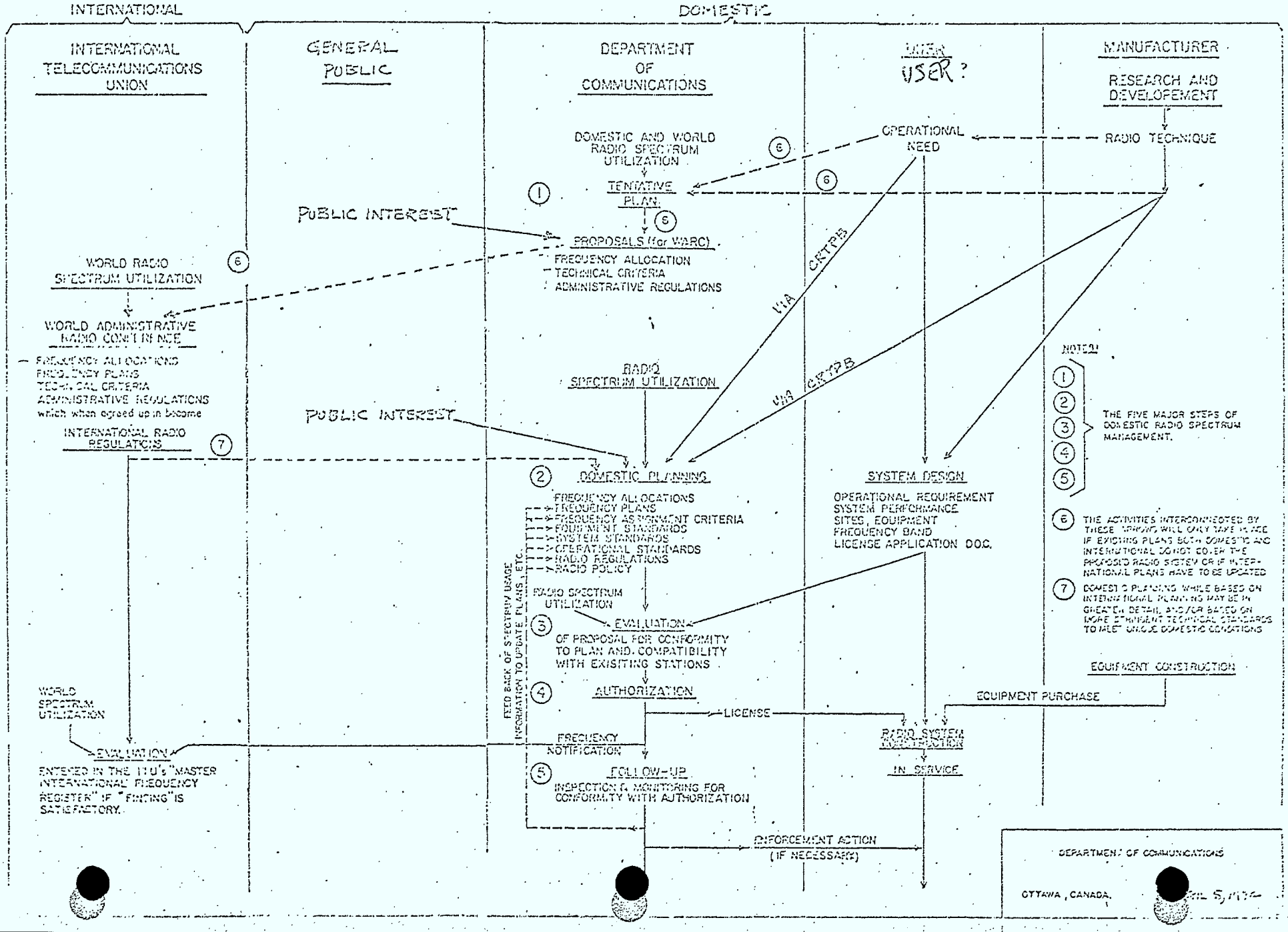
First, a broad allocation of frequencies and services on a global basis was performed through the auspices of the International Telecommunications Union. Then these broad allocations were subdivided among more discrete services in the light of present and forecast demand for them. The third step

was to license a specific applicant to a particular frequency on essentially a first come, first serve basis. Additional details of this spectrum planning process are provided in Figure 2.

A licence was usually issued in response to an applicant's request to use a given frequency or number of frequencies. Occasionally one or two of these applications would encompass an issue whose scope, impact and importance was greater than normal. Often the issue would concern a technological innovation that created a new spectrum-based service or that made a new portion of the spectrum available. As well, the issue could be a problem relating to existing services in existing bands. It was common for such problems and opportunities to be encountered in the United States some years in advance of Canada. In many such instances, the American government response was adopted with appropriate modifications to suit any uniqueness in the Canadian situation.

As the existing services were relatively few and lots of spectrum was readily available, the method used in handling these broader issues on spectrum utilization was simple, straight forward and usually undocumented. To begin with, these broad spectrum issues were addressed by the same government officials who were responsible for day-to-day matters concerning telecommunications regulation. In the main they were radio engineers and technicians who naturally tended to view the issues in such terms as power requirements, interference levels and propagation patterns. Technical factors dominated their investigations and determined their recommendations. Little or no economic or other analyses were conducted by them. Where the public interest was at stake, they interpreted its nature, extent and significance. These officials normally limited their consultations on the issues to associations of manufacturers, suppliers and operators of radio equipment. If bilateral coordination with the U.S. was appropriate, these

FREQUENCY MANAGEMENT IN CANADA
IN FLOW CHART FORM



consultations would be extended to their American government counterparts.

In summary, although the details are sketchy and the methodology is undocumented, it appears that since there was an abundance of spectrum, there were few problems concerning frequency allocation and those that did arise were quite limited in scope and impact. As a result, there was little need to be concerned with the process by which such problems were handled. More recently, however, certain events have created new pressures and demands which increasingly call into doubt the relevance of the historical process.

The Need For Change

The need for improving upon the historical method for making spectrum utilization policies has been created by a combination of general and specific events. Among the more general events one can include the following:

- the realization that our society is becoming more complex and interdependant and that the natural resources underpinning it are becoming scarce, less accessible and more costly.
- the challenging of traditional economic values such as growth and progress and major institutions such as government, business and organized labour.
- the advent of instantaneous, global communications which makes more people more aware of the events which can affect them
- the accelerating rate of change, particularly technological
- the growing influence of issue-oriented, layman supported pressure groups in the policy-making activities of governments and big businesses and the encouragement of participatory democracy.
- the advent of the policy sciences and more sophisticated approaches to problem solving

As well, one can identify the following events which bear directly upon spectrum utilization:

- the more active involvement of provincial and municipal governments in communications matters
- the fuller realization that the spectrum is a finite and valuable natural resource which warrants more comprehensive planning and control of its use to ensure maximum benefits accrue to Canadian society and to secure needed capital investment for its development or conservation.
- the steady increase in the number of radio services and the congestion of certain bands in the spectrum are creating conflicting requirements for additional spectrum and hence the need for and resistance to reallocating and rationalizing its use

The Canadian government responded to these pressures in a number of ways. Of particular note here was the creation of the Department of Communications in 1969 and its subsequent reorganization in 1973 by which the Directorate of Spectrum Utilization was established to address major problems concerning the use of the spectrum. More specifically, the primary objective of the new directorate is to formulate and recommend policies on the use of the radio frequency spectrum which take into account relevant social, economic, technological and political factors and more strategic federal policies and priorities. It is anticipated that the following will be the subjects of future spectrum policies:

- the first time allocation of a new band
- the first time allocation of a new service
- the reallocation of existing services and bands
- the rationalization of existing services in an existing band
- the determination of the basis for and amount of licensing fees
- the analysis of the impact of technological developments and forecasts of demand for radio services on the spectrum

- the preparation of Canadian government proposals to the International Telecommunications Union on the foregoing and the analysis of the impact of related ITU proposals.
- the analysis of the impact of broader federal policies on spectrum utilization
- the determination of socio-economic benefits of the spectrum to Canadian society and of ways for its valuation.

Specific projects will be undertaken to formulate policies on the issues and opportunities that arise in each of the foregoing subject areas. The organizational framework in which nearly all of the policy projects will be conducted will be essentially matrix in nature. As such, the Directorate will act as the project planner and coordinator with its staff members integrating the inputs on social, economic, operational and other factors provided by experts located in other units within and beyond the Department. The ensuing policy proposals prepared by the Directorate will typically have to be approved by the Minister of Communications, in view of the very nature of the subject matter and the wider range of more varied and active interested parties. In some instances Cabinet approval will be required as well.

Toward An Improved Spectrum Policy-Making Process

The above-noted points necessarily affect the nature of the process by which spectrum policies are formulated. They in fact give rise to some general design criteria for the process. For example, the process will have to contain a mechanism for setting and revising priorities for, as well as allocating human and other resources to competing policy projects. The SADM will likely be involved in this aspect of the process given the matrix organization and the need for at least ministerial approval of ensuing policy proposals. Another key element required by

the foregoing is that of policy project definition. Without a full definition of the need for, the nature of and the tasks and resources involved in a possible policy project, it will be very difficult to assign it a realistic priority or to carry it out in a timely, economic and comprehensive manner.

Further, the process must be designed to accommodate any requirements for format and content of ministerial and Cabinet submissions seeking approval of spectrum policy proposals. Another major component will be a system which enables the Directorate to plan and control the timely passage of various policy projects through the process.

The model depicted in Figure 3 will be used as the starting point in the development of the required process or methodology. It is basically a combination of the policy science and rationalist models described elsewhere in this paper. Considerable development work must be done to convert this general model into a usable process. For example, how and who should take each of the steps outlined in Figure 3 will have to be determined. Also, additional steps will likely have to be incorporated to make the process as free as possible from the pitfalls encountered in previous policy-making endeavours.

Figure 3

A General Process For Spectrum Policy-Making

INITIATION STAGE

- Major Spectrum Problem Recognized
- Define Spectrum Policy Project
- Assign Priority Relative to Other Projects
- Approve Policy Project
- Set Up Project Team and Management System

INVESTIGATION STAGE

- Gather Data (history, current situation, trends and forecasts)
- Analyse Data
- Identify and Evaluate Issues and Options
- Prepare Working Paper and Consultation Plan
- Approve Working Paper and Consultation Plan

CONSULTATION STAGE

- Distribute Working Paper Per Approved Consultation Plan
- Obtain and Evaluate Feedback of Interested Parties
- Convene General Meeting of Interested Parties (if necessary)
- Finalize Data Gathering

POLICY PROPOSAL STAGE

- Prepare Draft Policy Proposal and Implementation Plan
- Obtain Ministerial Approval
- Prepare Cabinet Submission and Obtain Cabinet Approval (if necessary)

POLICY IMPLEMENTATION STAGE

- Announce and Circulate Approved Policy
- Obtain International Acceptance (if necessary)
- Monitor Policy's Implementation
- Arrange For Periodic Review of the Policy

THE LITERATURE SURVEY

The journals, articles, and books referenced in the course of the literature survey are listed in the bibliography attached to this paper. The purpose of this section is to integrate and summarize their content and to draw some conclusions on the state of the art and science of public policy-making.

Definition of Policy

It seems that policy, like beauty, is in the eye of the beholder. Certainly the political scientist, the policy scientist and the practitioner have quite different perspectives on what policy is. Although others can be cited, the following four definitions pretty well encompass the range of possibilities. Policies are:

1. the government's positions on an area of significant concern to the political system.
2. the decisions made by the most senior executives in the organization and which apply to a long time period and involve or result in the use of significant resources
3. the determining of who gets what, when and how
4. general statements of preferences, intentions, course of action made by the political executive on matters about which there is current political controversy.

After discussing the foregoing within the National Telecommunications Branch, the following definition is offered with respect to spectrum utilization:

"Spectrum policies are those decisions, made by the Minister or Deputy Minister on spectrum matters, which simultaneously (a) entail the resolution of conflicts, (b) apply or are intended to apply to a long time period, (c) involve or result in the use of significant resources, and (d) require the consideration of socio-economic, commercial, political (both domestic and international) and technical factors."

Models Of The Policy-Making Process

Those who develop models of the policy-making process are basically attempting to do four things. First, they are trying to identify how policies are formulated. Second, they want to define the roles and analyse the behaviour of the participants in the formulation process. Third, they strive to understand the interaction of the first two elements, particularly with reference to the policies produced. Fourth, they seek to improve the efficiency of the formulation process and the effectiveness of the policy content. Overall, models are intended to enhance one's understanding of what impedes and what supports the realization of better policies.

Currently, there are five somewhat different models of the policy-making process. That there are five rather than one or two models can be due to the tendency that most research and analysis to date has been done on a case study basis with respect to a very specific policy area. Each model will be described in terms of its major features and where possible, the advantages and disadvantages of using it.

(a) Lindblom's Model

This model concentrates on that aspect of the policy-making process concerning the identification and evaluation of alternative solutions.

It attempts to describe the actual situation rather than prescribe an ideal one. Lindblom contends that policy-making is disjointed and incremental in nature. The process consists of a series of disjointed actions in which the policy formulators muddle through a limited number of closely related alternatives which vary only marginally from the existing policy. Muddling through includes: evaluating the alternatives in an incomplete and partisan way, identifying only a few of the possible consequences of each alternative, making little attempt to inter-relate interacting policies, and recommending a particular alternative almost exclusively on the basis of short term technical factors. In more common parlance the process is known as ad hocing and the band-aid or piecemeal approach.

(b) Rationalist Model

Whereas Lindblom's Model is descriptive and real-world based, the Rationalist Model is prescriptive and idealistic. The major elements in this model are:

- the existence of a policy problem is recognized
- the nature of the problem is investigated and fully defined
- alternative solutions - each significantly different - are generated
- values and priorities of the decision-maker are determined and ranked
- risks and consequences of each alternative are defined, weighted and compared
- an alternative is recommended on the basis of the preferred set of consequences

The Rationalist Model is somewhat broader in scope as it includes a problem recognition and problem definition phase. It attempts to overcome two major

shortcomings of Lindblom's Model, namely; the marginally different alternatives and the lack of an explicit definition of the decision-maker's values and priorities.

(c) Etzioni's Mixed-Scanning Model

Etzioni's Model tries to combine the Lindblom and Rationalist Models in such a way as to maximize their respective strengths while reducing their weaknesses. The scanning element attempts to reduce quickly the range of significantly different alternatives so that only a few need be subjected to the in-depth analysis called for in the Rationalist Model. His basic aim, then, appears to be to economize effort, time and money without sacrificing the quality of the end product.

(d) Lowi's Model

Lowi's main contributions to the development of a better policy-making process are two in number. First, he advocates that the process should be determined by the general nature of the policy it is intended to produce. Second, and as a direct result of his first point, he suggests that there are three different processes, namely the distributive, regulatory and redistributive policy-making processes. The distributive process applies to a situation where little conflict is probable as the various interested parties assume a position of mutual non-interference in the expectation that each, in turn, will get what it wants from the policy-maker. Grants for the fine arts and subsidies to export manufacturers are cases in point. The regulatory process would pertain where conflict between two parties is an inherent feature and there is the prospect of a clear win-lose conclusion. An example would be the allocating of a profitable air route to one of two or more airlines. The redistributive process entails robbing the rich and giving to the poor. The policy problem

is characterised by basic value systems of large and powerful institutions or different social classes being openly at odds.

Lowi's main point is that the mechanics of each process and the behaviour of those participating in them will be significantly different. However, the salient features of the mechanics and the behaviour patterns have not been identified.

(e) The Policy Sciences Model

The Policy Sciences Model conceives the policy-making process as having six sequential stages, namely, invention/initiation, estimation, selection, implementation, evaluation and termination. It also posits that three distinct roles - the policy formulator, the decision-maker and the policy implementer - must be provided for in the process.

The invention/initiation stage is one of the three least developed and least understood in the process. It demands a great deal of conceptual and creative thinking as its prime emphasis is on developing a clear and comprehensive definition of the problem and its possible solutions. Often, this can entail a number of trial and error type iterations in the problem-solution-redefined problem cycle.

The primary aim of the estimation stage is to reduce the range of possible solutions to a more limited number of probable solutions. It includes the identification and assessment of the impact, consequences, uncertainties, costs and benefits associated with each possible course of action. It involves the application of generally-accepted scientific and value-based analytical techniques such as cost-benefit analysis, sensitivity analysis and risk preference curves.

The selection stage entails the choosing of an option from the limited array of probable options. This is where the policy formulator role

and personality gives way to the decision-maker role and personality.

The implementation stage is another of the least developed and understood stages. All too often there is a tendency for things to go off track during this stage of transition from planning to doing. One common reason is inadequate liaison between the policy formulator and the policy implementer during the earlier stages of the process assuming, of course, that both exist.

The measuring of actual results against those estimated in the policy formulation stages is the principal purpose of the evaluation stage. It determines the need for revising the selected policy, for amending the programs implemented to achieve the policy objective or for terminating the policy and programs.

This brings us to the termination stage; the third of the three least understood stages. Its importance is increasing in step with the accelerating rate of change which suggests that some policies and programs must surely be outdated, un-necessary or dysfunctional.

Concluding Comments

From the foregoing summary of the literature survey a number of points become quite obvious. Policy-making is still an art rather than a science. Little agreement exists among the policy scientists as to what policy is, what constitutes a good policy-making process, what principles should be followed or what pitfalls should be avoided. The advent of pressure groups and their impact on the public policy-making process has yet to be seriously addressed by the policy scientists. Thus the practitioner cannot expect much in the way of guidelines from the policy sciences on how to proceed.

In essence, a lot of new ground will have to be broken in the

development of a methodology for making policies on spectrum utilization.

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APPENDIX B

BMC Project 2-1223

Interviewees

I. Department of Communications

A. Adey	Directorate of Spectrum Utilization
R. Begley	Directorate of Spectrum Utilization
J. Crowson	Director, Network Development
K. Hepburn	Director General, National Telecommunications Branch
R. Jones	Directorate of Spectrum Utilization
C. Kenny	Directorate of Network Development
J. Silkans	Social Policy and Programs Branch
W. Wilson	Director, Spectrum Utilization

II. Other Federal Government Departments and Agencies

R. Atkey	Bureau of Management Consulting
G. Currie	Bureau of Management Consulting
C. Demers	Privy Council Office
R. Elver	Energy, Mines and Resources, Mineral Policy Review
P. Grant	Canadian Radio-Television Commission
R. Haack	Regional Economic Expansion
F. Neville	Privy Council Office
F. Reuben	Energy, Mines and Resources, Energy Conservation Program
M. Rochon	Prime Minister's Office
R. Toombs	Energy, Mines and Resources, Energy Policy Review

III. Non-Government Organizations

L. Balcer	Electronics Industries Association of Canada
M. Davies	Canadian Telecommunications Carriers Association
T. Mimmee	Electronics Industries Association of Canada
R. Short	Canadian Cable Television Association